# OPERATOR'S, ORGANIZATIONAL, FIELD, AND DEPOT MAINTENANCE MANUAL FOR CV-1750/U ELECTRONIC FREQUENCY CONVERTER AND FE-25-1 FREQUENCY EXTENDER

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# OPERATOR'S, ORGANIZATIONAL, FIELD,

# AND DEPOT MAINTENANCE MANUAL

# FOR

# CV-1750/U ELECTRONIC FREQUENCY CONVERTER
(FSN 5820-070-7967)

# AND

# FE-25-1 FREQUENCY EXTENDER

COMMUNICATION ELECTRONICS, INC.
4908 HAMPDEN LANE
BETHESDA 14, MARYLAND

200/1/22/64

WARNING

Be careful when working on the 115-volt ac line connections. Serious injury or death may result from contact with these terminals.

ELECTRONIC FREQUENCY CONVERTER, CV-1750/U


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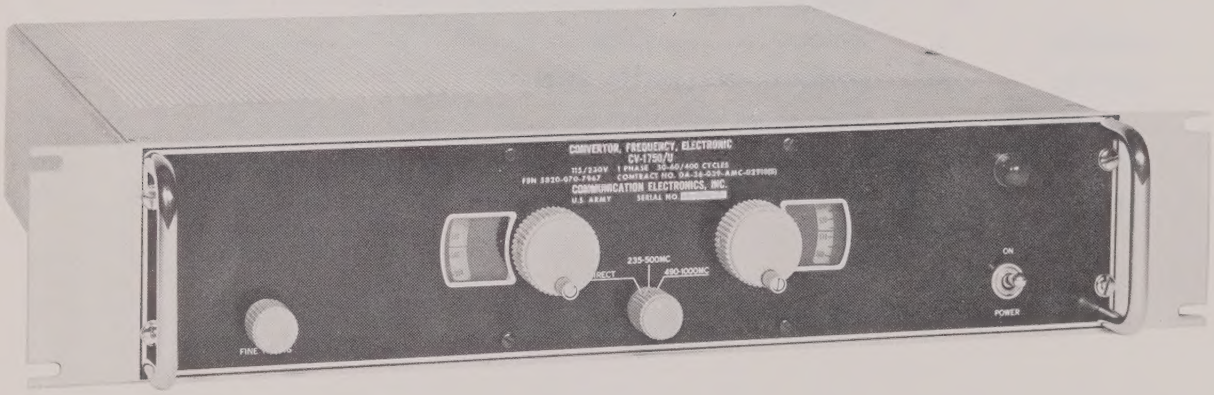



Figure 1. Electronic Frequency Converter CV-1750/U, Front View

# CHAPTER 1

# INTRODUCTION

## Section I. General

### 1. Scope

This technical manual describes the Electronic Frequency Converter CV-1750/U (hereafter called frequency converter) and covers its installation, operation, theory, and maintenance. It includes operation under usual conditions, cleaning and inspection of the equipment, replacement of parts, trouble-shooting, alignment procedures and repair applicable to all echelons of maintenance. This manual is also applicable to the type FE-25-1 Frequency Extender with the following exceptions: the running spares listed in par. 5 b. are not furnished with the FE-25-1 (or with the CV-1750/U under some procurements); the Forms and Records in par. 2 are not applicable; the packaging method may differ from the method described in Chaper 2; and Chapter 6, Section II is not applicable. In addition, commercial test equipment may be substituted for that listed in the text as follows: use a Tektronix 503 Oscilloscope for the OS-46/U or AN/USM-50A; an RCA WV-98B VTVM instead of the TS-505/U; Hewlett-Packard 606, 608, and 612 Signal Generators in lieu of the AN/USM-44, AN/URM-25 and AN/URM-49; and a CEI type 960A Receiver for the R-1279/URR.

### 2. Forms and Records

a. Report of Damaged or Improper Shipment. Fill out and forward DD Form 6 (Report of Damaged or Improper Shipment) as prescribed in AR 700-58.

## Section II. Description and Data

### 3. Purpose and Use

The frequency converter is used to extend the frequency range of any receiver which tunes to 60 mc. The frequency converter's range is from 235 mc to 1000 mc in two bands. The low band frequency is 235 mc to 500 mc, and the high band frequency is 490 mc to 1000 mc.

a. The frequency converter is designed for use with any receiver which may be tuned to 60 mc and any antenna in the range of 235 mc to 1000 mc which operates unbalanced and has an output impedance of 50 ohms.

b. Figure 2 is a simplified block diagram of the frequency converter showing the interrelationship of the high and low band r-f tuners and the antenna input. When a DIRECT input is selected for an antenna below 235 mc, it is applied directly to the output of the frequency converter through the band selector circuit. When a LOW input is selected for an antenna in the 235 mc to 500 mc range, it is applied to two r-f amplifiers in series and then to a mixer. This input is combined with the output from a local oscillator and the resultant 60-mc i-f output of the mixer is applied to the frequency converter output through the band selector circuit. When a HIGH input is selected for an antenna in the 490 mc to 1000 mc range, it is applied to a series of preselectors and combined in a crystal detector with the output from a local oscillator. The difference frequency is applied to a 60-mc cascode amplifier where the 60 mc i-f signal is fed to the frequency converter output through the band selector circuit.

### 4. Technical Characteristics

| | |
|---|---|
| Frequency range | |
| Low band | 235 mc- 500 mc |
| High band | 490 mc- 1000 mc |
| Input Impedance | Suitable for 50-ohm source |
| Noise figure | |
| Low band | 10 db, maximum |
| High band | 12 db, maximum |
| Image Rejection | 65 db, minimum |
| I-F rejection | 75 db, minimum |
| Output | |
| Frequency | 60 mc |
| Bandwidth | 2 mc |
| Impedance | Suitable for 50-ohm load |
| Oscillator to Antenna Conduction | |
| Low Band | 25 μv, maximum |

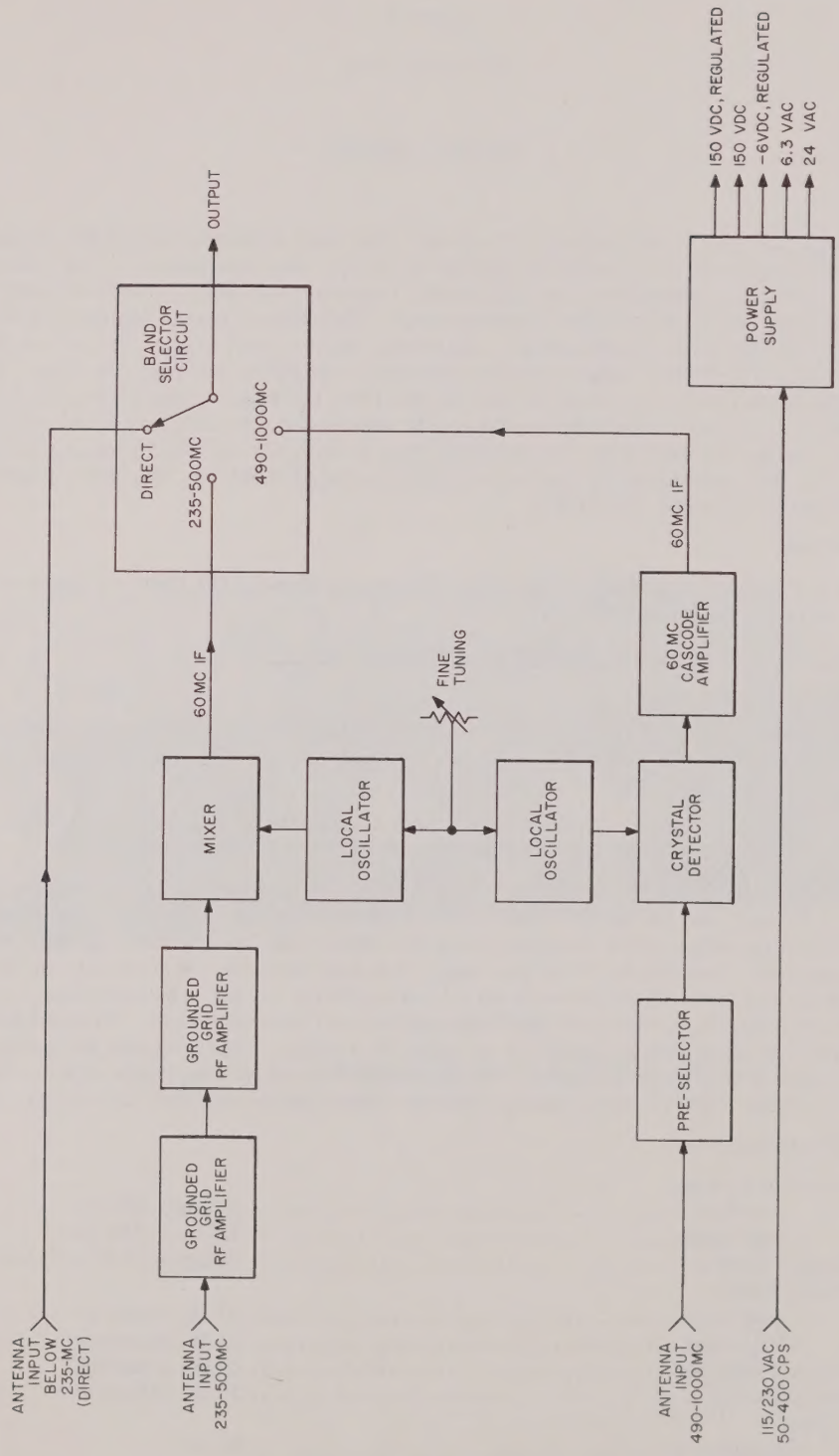



Figure 2. Electronic Frequency Converter CV-1750/U, Block Diagram

| | |
|---|---|
| High band | 75 μv, maximum |
| Power | |
| Input | 115 vac or 230 vac, 50-60/400 cps |
| Consumption | 30 watts, maximum |
| Ambient temperature range | 0 to 55° C |
| Number of tubes | 7 |
| Weight | 15 lbs. |
| Size | 19 in. x 3.5 in. x 14 in. |

5. Components of Electronic Frequency Converter CV-1750/U

a. Components. This equipment consists of Electronic Frequency Converter CV-1750/U only. The dimensions and weight are 19 in. x 3.5 in. x 14 in. and 15 lbs.

b. Running Spares. The following spares are supplied.

| Qty | Item |
|---|---|
| 5 | Fuse (Bussman Slow-Blow), 0.15-ampere |
| 5 | Fuse (Bussman Slow-Blow), 0.3-ampere |
| 1 | Lamp (GE 47), 6.3 volts, 0.15-ampere |
| 1 | Lamp (GE 345), 6.3 volts, 0.04-ampere |
| | Electron tubes: |
| 1 | GE 7077 |
| 1 | GE 7486 |
| 1 | RCA 6CW4 |
| 1 | RCA 7587 |

6. Description of Electronic Frequency Converter CV-1750/U

The frequency converter consists of a plug-in power supply module, a high (490 mc - 1000 mc) band tuner, and a low (235 mc - 500 mc) band tuner. Inputs may be from antennas below 235 mc (direct), from 235 mc to 500 mc, or, from 490 mc to 1000 mc. All input and output connections are made in the rear of the unit and selected by front panel switching. A fine tuning control is also located on the front panel. The frequency converter is designed to operate with any receiver which will tune to 60 mc.

7. Additional Equipment Required

The following equipment is not supplied as part of the Electronic Frequency Converter CV-1750/U, but is needed for use with the unit:

a. Receiver. Any receiver capable of tuning to 60 mc with an input impedance of 50 ohms.

b. Cable. A coaxial cable with a BNC type UG-88/U (FSN 5935-823-0833) plug to connect to a BNC receptacle jack to interconnect the receiver and the frequency converter.

c. Less than 235 mc Antenna. Any antenna operating below a frequency of 235 mc, having an output impedance of 50 ohms, unbalanced, with an RG-55 coaxial cable with an N type UG-536A/U (FSN 5935-642-0482) plug to connect to an N type UG-1052/U receptacle jack.

d. 235 mc - 500 mc Antenna. Any antenna operating within a frequency range of 235 mc to 500 mc, having an output impedance of 50 ohms, unbalanced. It must have an RG-55 coaxial cable with an N type UG-536A/U plug to connect to an N type UG-1052/U receptacle jack.

e. 490 mc - 1000 mc Antenna. Any antenna operating within a frequency range of 490 mc to 1000 mc, having an output impedance of 50 ohms, unbalanced. It must have an RG-55 coaxial cable with an N type UG-536A/U plug to connect to an N type UG-1052/U receptacle jack.

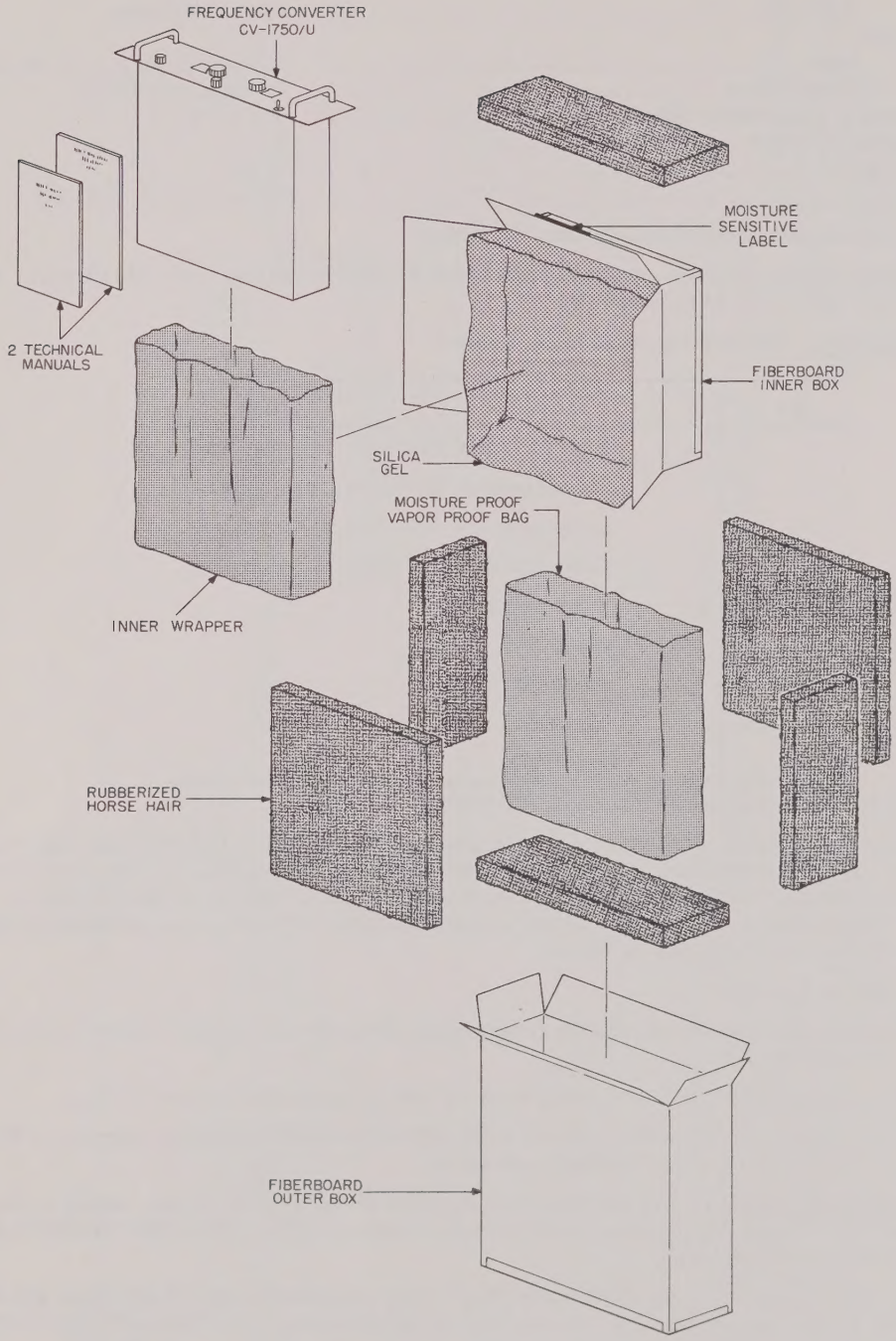



Figure 3. Packaging Diagram

## CHAPTER 2

## INSTALLATION

8. Unpacking

a. Packaging Data. When packaged for shipment, the Electronic Frequency Converter CV-1750/U is placed in a carton with an inner moistureproof-vaporproof container as shown in figure 3. The carton is 8.5 inches high by 24 inches long by 22 inches deep, and occupies 3.87 cubic feet with a weight of 20 pounds.

b. Removing Contents. The frequency converter is unpacked as follows:

(1) Open the outer fiberboard carton and remove the rubberized horsehair padding and the outer moistureproof-vaporproof bag.

(2) Open the outer moistureproof-vaporproof bag and open the inner fiberboard carton within it. Remove the inner wrapper.

(3) Open the inner wrapper and remove the two technical manuals and the frequency converter.

9. Checking Unpacked Equipment

a. Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, report the damage according to instructions previously described in paragraph 2.

b. See that the equipment is complete as listed in the table of components in paragraph 5.

10. Siting

The Electronic Frequency Converter CV-1750/U is designed to be mounted in a standard 19-inch relay rack indoors. The installation should be chosen so that it is convenient to transmission lines, power connections, and adequate lighting. Temperature control within the area should be capable of allowing the frequency converter to operate within its ambient temperature range.

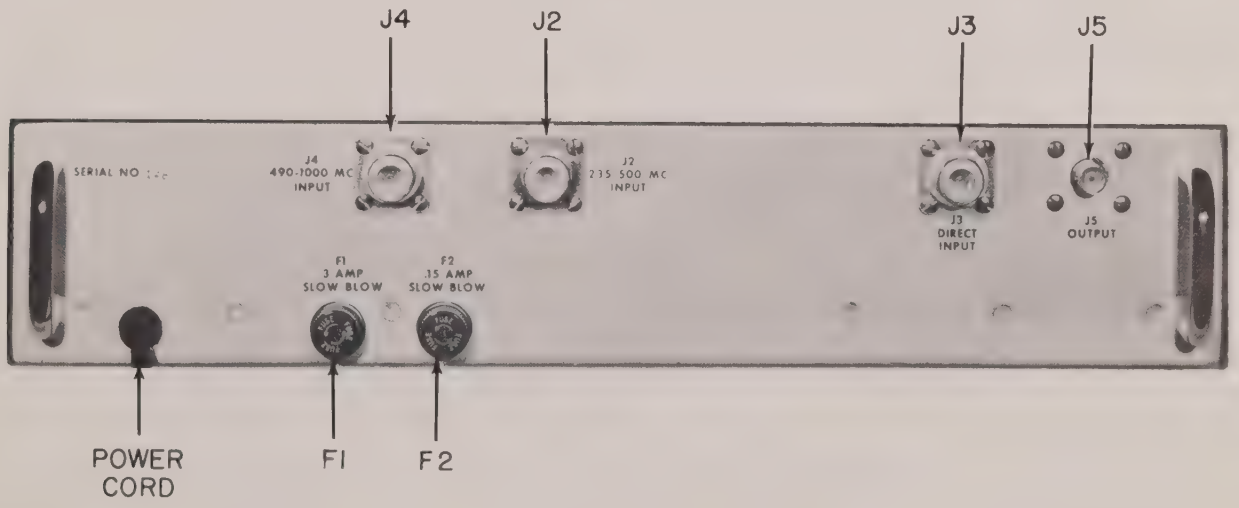



Figure 4. Electronic Frequency Converter CV-1750/U, Rear View

11. Installation

All components necessary to install the complete equipment are provided with the frequency converter. Insure that all tubes are firmly seated within their proper sockets. The tube locations are shown in figures 6 and 7. After replacing the covers, the equipment may now be rack mounted in a standard relay rack allowing 3.5 inches of vertical space and 14 inches depth in the rack.

12. Connections

All connections to the frequency converter are made in the rear of the equipment. Determine whether the supply voltage is 115 vac or 230 vac. Then set the slide switch on the chassis top (see figure 6) in the proper position. Plug the power cord into the voltage source; the third pin on the plug grounds the unit. If a three pin receptacle is not available, use the three-to-two pin adapter provided. When the adapter is used, the ground lead from the adapter must be connected to ground. Connect the coaxial cable from the high frequency (490 mc - 1000 mc) antenna to connector jack J4 490 - 1000 MC INPUT located on the rear of the equipment. Connect the coaxial cable from the low frequency (235 - 500 mc) antenna to connector jack J2 235 - 500 MC INPUT located on the rear of the equipment. Connect the coaxial cable from the antenna with operating frequencies below 235 mc to connector jack J3 DIRECT INPUT located on the rear of the equipment. Connect the cable from the 60-mc receiver input to connector jack J5 OUTPUT located on the rear of the equipment. The following is a list of cables required for operation of the frequency converter. Lengths of cables will vary dependent upon the specific location. These cables are not supplied with the equipment (see paragraph 7).

| Cable No. | Cord | Required No. | From | Connects To |
|---|---|---|---|---|
| 1 | | 1 | 490 mc-1000 mc Antenna | Frequency Converter |
| 2 | | 1 | 235 mc-500 mc Antenna | Frequency Converter |
| 3 | | 1 | Under 235 mc Antenna | Frequency Converter |
| 4 | | 1 | Frequency Converter | Receiver |

# CHAPTER 3

# OPERATING INSTRUCTIONS

## Section I. Operator's Controls and Indicators

13. Electronic Frequency Converter CV-1750/U, Controls and Indicators

| Control or Indicator | Function |
|---|---|
| POWER ON switch | Turns power on and off. |
| Power lamp | Lights when power is applied to the equipment |
| Band selector, DIRECT, 235-500 MC, 490-1000 MC | In DIRECT position, receives signals below 235 mc. In 235-500 MC position, receives low frequency. In 490-1000 MC position, receives high frequency. |
| Low band tuning indicator | Graded dial from 235 to 500; dial lights when this range is selected. |
| High band tuning indicator | Graded dial from 490 to 1000; dial lights when this range is selected. |
| Low band tuner knob | Variable control used to tune from 235 mc to 500 mc. |
| High band tuner knob | Variable control used to tune from 490 mc to 1000 mc. |
| Fine tuning knob | Allows fine (vernier) tuning to the frequency converter. |

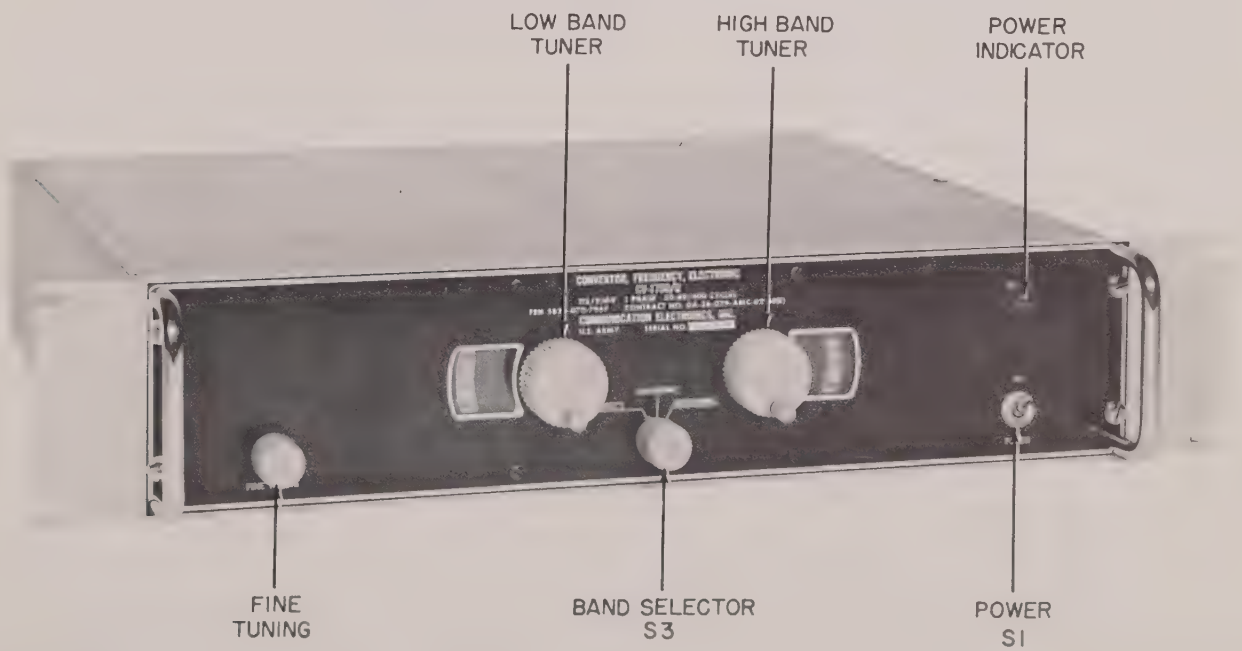



Figure 5. Operating Controls

## Section II. Operation Under Usual Conditions

14. Starting Procedure

a. Preliminary. Set the band selector switch to the frequency band to be used; set the FINE TUNING control to mid-range.

b. Starting. Turn on the frequency converter by placing the power switch located on the right-hand side of the front panel to the ON position. The power lamp will light, and the low or high band indicator dial lamp will light if either the low or high band has been selected. If the direct position has been selected, only the power lamp will light.

15. Tuning Procedure

During reception of signals below 235 mc, tuning should be performed directly with the tuning controls of the receiver with which the frequency converter is being used. During reception of signals above 235 mc, the receiver must first be tuned to exactly 60 mc, and then additional tuning should be performed at the frequency converter with either the low band or high band tuning control. The fine tuning control should be used as necessary when tuning the frequency converter. This control has no effect when the band selector switch has selected a direct input.

16. Operating Procedures

Start the equipment as instructed in paragraph 14, and perform the following steps:

a. Set the band selector switch to the DIRECT, 235-500 MC, or 490-1000 MC position depending on the frequency of the signal to be received.

b. If the 235-500 MC or 490-1000 MC position is selected, carefully tune the associated receiver to exactly 60 mc.

c. Adjust the tuning knob on the frequency converter corresponding to the band selected for the desired frequency.

d. Adjust the FINE TUNING control on the frequency converter as necessary to make small corrections in tuning.

17. Stopping Procedure

When it is desired to stop operating the equipment, place the POWER switch in the OFF position.

# CHAPTER 4

# MAINTENANCE INSTRUCTIONS

## Section I. Organizational Maintenance

CAUTION

The physical placement and lead length of components in the two tuners are extremely critical. When replacing any component in the tuners, the new part must duplicate the location and lead length of the original part. In addition, certain component locations are sufficiently critical to preclude their replacement at any maintenance level. These components are suitably indicated on the illustrations, schematic diagrams, and in the parts list.

18. Scope

This section contains instructions for organizational maintenance of Electronic Frequency Converter CV-1750/U. Organizational maintenance consists of replacement of defective fuses, preventive maintenance, visual inspection, trouble-shooting, and replacement of defective tubes.

19. Tools, Materials, and Test Equipment Required

The tools, materials, and test equipment required for unit repairman's maintenance are listed below.

a. Tools.

(1) Tool Equipment TK-105/G

(2) Six-pin tube puller

b. Materials.

(1) Solvent, dry-cleaning, per DA TB9-268 dtd 10 Nov. 1959

(2) Dry brush

(3) Cleaning cloth

c. Test Equipment

(1) Vacuum tube voltmeter, TS-505A/U

(2) Tube tester TV-2/U

20. Preventive Maintenance

Preventive maintenance is work performed on equipment to keep it in good working order so that breakdowns and needless interruptions in service will be kept to a minimum. Preventive maintenance differs from trouble-shooting and repair since its object is to prevent certain troubles from occurring. These operations should be performed at the intervals indicated, unless altered by the local commander.

a. General Maintenance Techniques

(1) Use a dry brush for cleaning. If necessary, except for electrical contacts, moisten the brush with a dry cleaning solvent, then wipe the parts dry.

WARNING

Cleaning compound may be flamable and its fumes are toxic. Provide adequate ventilation. Do not use near a flame.

(2) If available, dry compressed air may be used at a line pressure not exceeding 60 psi to remove dust from inaccessible places, taking care to avoid any mechanical damage.

(3) Screws, bolts, and nuts should not be tightened carelessly. Fittings tightened beyond the pressure for which they are designed may be damaged or broken.

b. Maintenance Checks.

(1) Check the following items daily.

(a) Clean exterior of front panel.

(b) Check operation of front panel lamps DS1, DS2, and DS3.

(c) Check knobs and switches.

(2) Check the following items weekly. Disconnect all power and input and output connections before performing the following operations. Upon completion, reconnect power, input, and output connections and check for satisfactory operation.

(a) Remove the frequency converter from its rack mounting and clean the exterior of the chassis and all accessible parts.

(b) Remove the dust covers and inspect filter capacitors C1 and C2 for leakage, bulging, and indications of overheating.

(c) Inspect power transformer for excessive heating.

(d) Inspect fuses F1 and F2 and fuse holders for corrosion, cracks, and lack of sufficient tension to insure good contact.

(e) Replace the dust covers.

(3) Visually check the following items monthly, and tighten and clean if necessary.

(a) Inspect tube and crystal sockets and pins for loose contacts, dirt, and corrosion.

(b) Inspect terminals of capacitors C1 and C2 for corrosion.

(c) Inspect resistors for blistering, discoloration, or other evidence of overheating.

(d) Inspect switches S1, S2, and S5 and gear train assembly for dirt, corrosion, loose contacts, and unsatisfactory mechanical action.

(e) Inspect wires, cords, and cables for cracked or frayed insulation.

(f) Inspect terminal board TB1 for cracks, dirt, and loose connections.

(g) Inspect potentiometer R6 for unsatisfactory electrical and mechanical operation.

(h) Inspect mountings, machine screws, and nuts for tightness.

(i) Inspect all accessible terminals for loose connections and corrosion.

(j) Inspect transistor Q1 for loose connections.

(k) Inspect input and output connector cables for loose connections.

c. Performance Check. After completing the above preventive maintenance checks, check the equipment for normal performance as described in Chapter 3.

21. Trouble-Shooting

The trouble-shooting and repair work that can be performed at the organizational maintenance level is necessarily limited by the tools, test equipment, and replaceable parts issued. Trouble-shooting is based on the performance of the equipment in determining such troubles as burned-out tubes or fuses. Before trouble-shooting the frequency converter, insure that the trouble is not in an antenna or in the associated receiver.

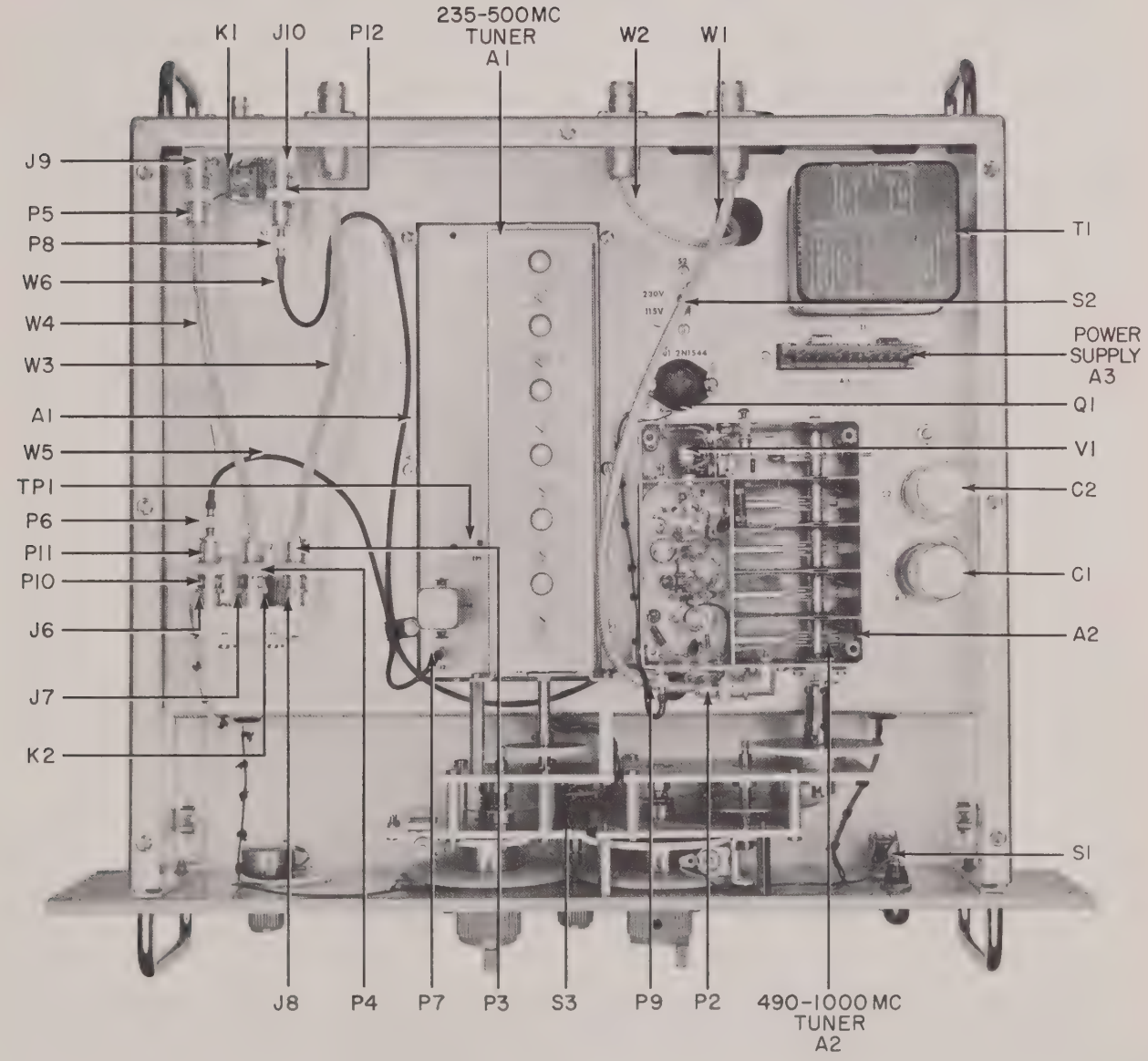



Figure 6. Top View, Location of Components

22. Visual Inspection

When failure is encountered, and the cause is not immediately apparent, check as many of the following items as is practical before starting a detailed examination of the component parts. Whenever possible, obtain information directly from the operator of the equipment regarding performance at the time trouble occurred. Failure of the frequency converter to operate properly will usually be caused by one or more of the following faults:

a. Worn, broken, or disconnected cables and plugs.

b. Burned-out fuses.

c. Defective tubes.

23. Equipment Performance Checklist

a. General. The equipment performance check list is a procedure to systematically check equipment performance. All corrective measures which the unit repairman can perform are given in the Corrective Measures column. When using the check list, start at the beginning and follow each step in order. If the corrective measures indicated do not fix the equipment, trouble-shooting is required by a higher echelon. Note on the repair tag how the equipment performed and what corrective measures were taken.

b. Procedure. Place the equipment in operation. Allow the equipment to warm up for several minutes. Operate the equipment as shown in the check list below.

c. Equipment Performance Check List.

| | Step | Action | Normal Indication | Corrective Measure |
|---|---|---|---|---|
| PREPARATORY | 1 | Connect input cable from antenna less than 235 mc to J3 DIRECT INPUT. | | |
| | 2 | Connect input cable from 235 mc-500 mc antenna to J2 235- 500 MC INPUT. | | |
| | 3 | Connect input cable from 490 mc-1000 mc antenna to J4 490- 1000 MC INPUT | | |
| | 4 | Connect output cable from 60 mc receiver to J5 OUTPUT. | | |
| | 5 | Set band selector switch to DIRECT, 235 - 500 MC, or 490-1000 MC for antenna to be used. | | |
| | 6 | Turn POWER-ON switch to ON position. | Power indicator lamp lights, and frequency dial indicator lamp lights if low or high band antennas have been selected. | Check fuses, power cord, and cable connections at rear of unit. |

| | Step | Action | Normal Indication | Corrective Measure |
|---|---|---|---|---|
| EQUIPMENT PERFORMANCE | 7 | Set band selector switch to DIRECT. | Signals may be received using receiver tuning controls. | Check K1, K2 |
| | 8 | Set band selector switch at 235 - 500 MC and adjust tuning knob and FINE TUNING control on frequency converter. | With receiver tuned to 60 mc, signals may be received through the frequency converter. | Check K1, K2, A1V1 thru A1V4. |
| | 9 | Set band selector switch at 490 - 1000 MC and adjust tuning knob and FINE TUNING control on frequency converter. | With receiver tuned to 60 mc, signals may be received through the frequency converter. | Check K1, K2 A2V1 thru A2V3 |
| STOP | 10 | Turn POWER-ON switch to off position. | Dial and power indicator lamps go out. | Check for faulty power switch. |

24. Tube Testing and Techniques

a. When trouble occurs, check all cabling and connections before removing any tubes. Isolate the trouble to the high band or low band tuner. If tube failure is suspected, check the tubes as described below. The tube locations are shown in figures 6 and 7.

CAUTION

Do not rock or rotate a tube when removing it from a socket; pull it straight out with a tube puller.

b. If a tube tester is to be used, remove and test one tube at a time. Discard a tube only if its defect is obvious or if the tube tester shows it to be defective. Do not discard a tube that tests at or near its minimum test limit on the tube tester. Put back the origianl tube, or insert a new one if required, before testing the next one.

c. If a tube tester is not available, the following chart provides voltage and resistance readings for a VTVM, using 115 vac line voltage. All tubes in the low band tuner (A1) are measured with the band selector switch in the 235-500 MC position. All tubes in the high band tuner (A2) are measured with the band selector switch in the 490-1000 MC position, and, unless otherwise specified, all voltages are positive dc with respect to ground.

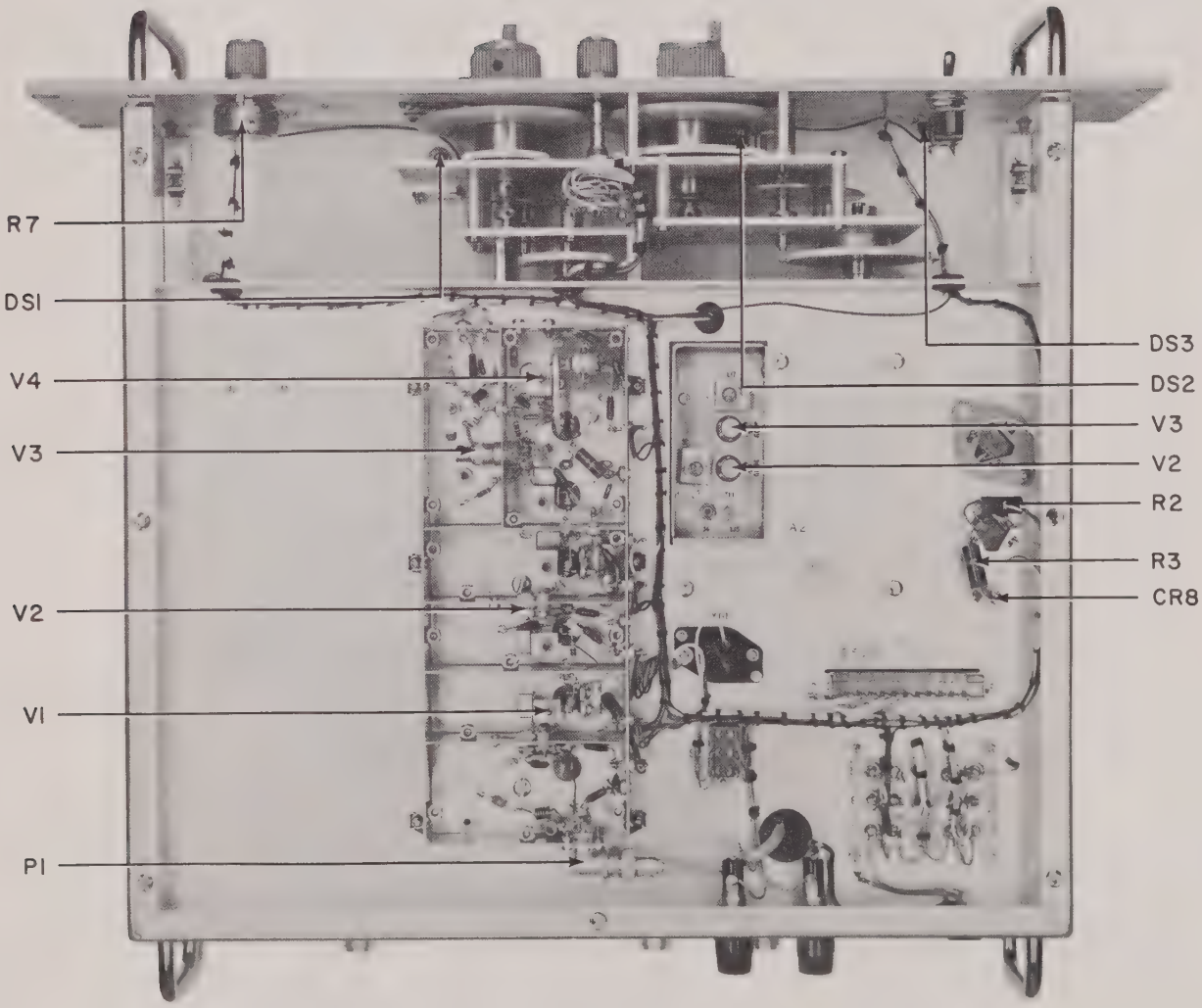



Figure 7. Bottom View, Location of Components

Voltage Readings

| Tube | Type | Pin Numbers | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2 | 4 Grid | 8 Cathode | 10 Heater | 12 Heater | Plate |
| A1V1 | 7077 | -- | 0 | 0.5 | 0 | 6.3 vac | 120 |
| A1V2 | 7077 | -- | 0 | 0.5 | 0 | 6.3 vac | 120 |
| A1V3 | 7587 | 16 | -2.5 (with 1 meg series resistor) | 0 | 6.3 vac | 0 | 140 |
| A1V4 | 7486 | -- | -4.5 (with 1 meg series resistor) | 0 | 0 | -6.0 | 90 (with 1 meg series resistor) |
| A2V1 | 7486 | -- | Do not measure. | 0 | 0 | -6.0 | 85 |
| A2V2 | 6CW4 | 75 | 0 | 0.4 | 0 | 6.3 vac | -- |
| A2V3 | 6CW4 | 140 | 68 | 75 | 0 | 6.3 vac | -- |

Resistance Readings

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| A1V1 | 7077 | -- | 0 | 1K | 0 | 0.3 | 200K |
| A1V2 | 7077 | -- | 0 | 1K | 0 | 0.3 | 200K |
| A1V3 | 7587 | 670K | 940K | 0 | 0.3 | 0 | 200K |
| A1V4 | 7486 | -- | 10K | 0 | 0 | 2 | 200K |
| A2V1 | 7486 | -- | 5.6K | 0 | 0 | 2 | 200K |
| A2V2 | 6CW4 | inf. | 47K | 68 | 0 | 0.3 | -- |
| A2V3 | 6CW4 | 200K | inf. | inf. | 0 | 0.3 | -- |

25. Removal and Replacement of Lamps

a. Power Indicator. The power indicator lamp may be removed by unscrewing the lampholder located in the right side of the front panel. It may be replaced by inserting a new type GE 345 6.3v, 0.04 amp lamp.

b. Dial Indicators. Both dial indicator lamps may be removed by unscrewing them from their clips mounted on the gear train assembly. They may be replaced by screwing a GE 47 6.3v, 0.15 amp lamp in their place.

26. Power Supply Module

The power supply module should first be checked to insure that all pins are properly seated in position. Voltage and resistance readings for the power supply module are made with VTVM using 115 vac line voltage and are listed in the chart below.

Power Supply Voltage and Resistance

| Pin Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Voltage | 14 vac | 14 vac | 0 | -21 vdc | -12 vdc | 150 vdc | 165 vac | 165 vac | -6.1 vdc | 75 vac | 200 vdc |
| Resistance (ohms) | 4 | 4 | 0 | 135 | 33 | 200K | 200 | 200 | 35 | 100K | 200K |

## Section II. Field and Depot Maintenance

WARNING

When servicing the frequency converter, be extremely careful because of the high voltages exposed. Always disconnect the power cord before doing any testing. With the high voltage off, large potentials may still be present. Before touching any part after the voltage is shut off, short that part to ground.

### 27. Trouble-Shooting Procedures

The first step in servicing a defective frequency converter is to localize the fault. Localization means tracing the fault to the defective part responsible for the abnormal operation of the set. Some faults, such as burned-out resistors and shorted transformers, can often be located by sight and smell. The majority of faults, however, must be localized by checking voltage and resistance.

a. Component Location. The tests listed below will aid in isolating the source of trouble. To be effective, the procedure should be followed in the order given. Remember that the servicing procedure should cause no further damage to the equipment. First the trouble should be localized to a single stage or circuit. Then, the trouble may be isolated within that stage or circuit by appropriate voltage and resistance measurements. The service procedure is summarized as follows:

(1) Visual inspection. Through the visual inspection alone, the repairman may frequency discover the trouble, or determine the stage in which the trouble exists. This inspection is valuable in avoiding additional damage to the frequency converter which might occur through improper servicing methods and in forestalling future failures.

(2) Operational test. The operational test, paragraph 29, is important because it frequently indicates the general location of trouble. In many instances the information gained will determine the exact nature of the fault. In order to utilize this information fully, all symptoms must be interpreted in relation to one another.

(3) Trouble-Shooting chart. The trouble symptoms listed in this chart will aid greatly in localizing trouble.

(4) Signal substitution. The principle advantage of the signal substitution method, paragraph 32, is that it usually enables the repairman to localize a trouble accurately and quickly to a given stage when the general location of the trouble is not immediately evident from the above tests.

(5) Intermittents. In all these tests the possibility of intermittents should not be overlooked. If present, this type of trouble often may be made to appear by tapping or jarring the equipment. It is possible that the trouble is not in the equipment itself, but in the installation (mounting, other equipment in the system), or the trouble may be due to external conditions. In this event, test the complete installation.

b. General Precautions. Whenever the frequency converter is serviced, observe the following precautions very carefully.

(1) Before a part is unsoldered, note the position of the leads. If the part, such as a transformer, has a number of connections, tag each of the leads to it.

(2) Be careful not to damage other leads by pulling or pushing them out of the way.

(3) Do not allow drops of solder to fall into the set, since they may cause short circuits.

(4) A carelessly soldered connection may create a new fault. It is very important to make well-soldered joints, since a poorly soldered joint is one of the most difficult faults to find.

(5) When a part is replaced in r-f or i-f circuits, it must be placed exactly as the original one was. A part which has the same electrical value but different physical size may cause trouble in high frequency circuits. Give particular attention to proper grounding when replacing a part. Use the same ground as in the original wiring. Failure to observe these precautions may result in decreased gain or oscillation of the circuit.

28. Test Equipment Required for Trouble-Shooting

The test equipment (or equivalent) required for trouble-shooting Electronic Frequency Converter CV-1750/U is listed below.

| Test Equipment | Model |
|---|---|
| Signal Generator | AN/URM-25 |
| Signal Generator | AN/USM-44 |
| Signal Generator | AN/URM-49 |
| Sweep Generator | Telonic HD-1A |
| Tube Tester | TV-2/U |
| Oscilloscope | OS-46/U or AN/USM-50A |
| Multimeter | TS-352/U |
| VTVM | TS-505A/U |

29. Operational Tests

If the frequency converter is connected to its associated system equipment as in normal operation, operate the frequency converter as described in the equipment performance check list in paragraph 23 because it frequently indicates the general location of trouble. Check the equipment for smoke and the odor of burned or overheated parts.

30. Trouble-Shooting Chart

The following chart is supplied as an aid in locating trouble in the frequency converter. This chart lists the symptoms which the repairman observes while making a few simple tests. The signal substitution tests outlined in paragraph 32 can then be used to supplement this procedure and to determine the defective stage. Once the trouble has been localized to a stage or circuit, a tube check, and voltage resistance measurements of this stage or circuit should ordinarily be sufficient to isolate the defective part. Normal voltage and resistance measurements for tubes are given in paragraph 24. Component locations are shown in figures 4 through 10. A wiring diagram for the unit is presented in Figure 20.

| Item | Indication | Probable trouble | Procedure |
|---|---|---|---|
| 1 | POWER-ON switch (S1) in ON position. Equipment fails to operate and indicator lamps do not light. | Equipment not properly connected to 115 vac or 230 vac external power source. | Check power cord and line voltage. |
| | | Open fuse F1 or F2. | Check and replace fuse if necessary.<br>Check positioning of switch (S2) for 115 vac or 230 vac as applicable. |
| | | Connecting leads to fuse holder(s) broken. | Repair leads. |
| | | Power and dial lamps defective. | Check lamps and leads. Replace or repair if necessary. |
| | | Power switch (S1) defective. | Replace power switch or repair leads if necessary. |
| | | Defective transistor Q1. | Using a VTVM, check the emitter for -6.0 vdc and 2 ohms, the base for -6.1 vdc, and the collector for -12 vdc. Do not measure resistance values for the base and the collector. Replace Q1 if defective. |
| | | Poorly connected power supply module (A3). | Check pins on plug-in card for proper seating. |
| | | Defective electronic components. | Check terminals of transformer, with a voltmeter, for values printed on transformer cover. |

| Item | Indication | Probable trouble | Procedure |
|---|---|---|---|
| | | | Check values of components shown on power supply module schematic diagram, figure 16. Replace defective components. |
| 2 | Band selector switch (S3) on 235-500 MC position. Equipment fails to operate. | Equipment not properly connected to external antenna (J2) or 60 mc receiver (J5). | Check connections at rear of equipment. Check coaxial cables to connector jacks J2 and J5. |
| | | Defective band selector switch (S3). | Replace band selector switch or repair leads if necessary. |
| | | Tuning dial not aligned to tuner shaft. | Realign tuning dial as described in paragraph 34. |
| | | Defective vacuum tubes. | Check voltage and resistance of tubes A1V1, A1V2, A1V3, and A1V4 with a VTVM for values shown in paragraph 24. |
| | | Defective electronic components. | Check values of electronic components shown on low band tuner schematic diagram, figure 17. Replace defective components. |
| | | Low band tuner out of alignment. | Realign tuner as described in paragraph 36.1. |
| 3 | Band selector switch (S3) on 490-1000 MC position. Equipment fails to operate. | Equipment not properly connected to external antenna (J4) or 60 mc receiver (J5). | Check connections at rear of equipment. Check coaxial cables to connector jacks J4 and J5. |
| | | Defective band selector switch (S3). | Replace band selector switch or repair leads if necessary. |

| Item | Indication | Probable trouble | Procedure |
|---|---|---|---|
| | | Tuning dial not aligned to tuner shaft. | Realign tuning dial as described in paragraph 34. |
| | | Defective vacuum tubes. | Check voltage and resistance of tubes A2V1, A2V2, and A2V3 with a VTVM for values shown in paragraph 24. |
| | | Defective electronic components. | Check values of electronic components shown on high band tuner schematic diagram, figure 18. Replace defective components. |
| | | High band tuner out of alignment. | Realign tuner as described in paragraph 36.2. |
| 4 | Band selector switch (S3) on DIRECT position. Equipment fails to operate. | Equipment not properly connected to external antenna (J3) or 60 mc receiver (J5). | Check connections at rear of equipment. Check coaxial cables to connector jacks J3 and J5. |
| | | Defective band selector switch (S3). | Replace band selector switch or repair leads if necessary. |
| | | Defective coaxial relays. | Check K1 and K2. |
| 5 | No change in frequency when using FINE TUNING control. | Defective FINE TUNING control. | Replace FINE TUNING potentiometer or repair leads if necessary. |

31. Signal Substitution Notes

a. Signal substitution requires a source of i-f and r-f signals.

b. A voltmeter, milliammeter, and tube tester are also needed to isolate the defective part after the faulty stage has been indicated by signal substitution.

c. In the tests indicated in paragraph 32, ground one side of the signal generator to the frequency converter chassis and connect the other side through a 0.05 μf capacitor to the frequency converter point as directed.

d. When working back from the output to the input stages, decrease the output of the signal generator as much as possible. If possible, compare with a frequency converter known to be in good condition.

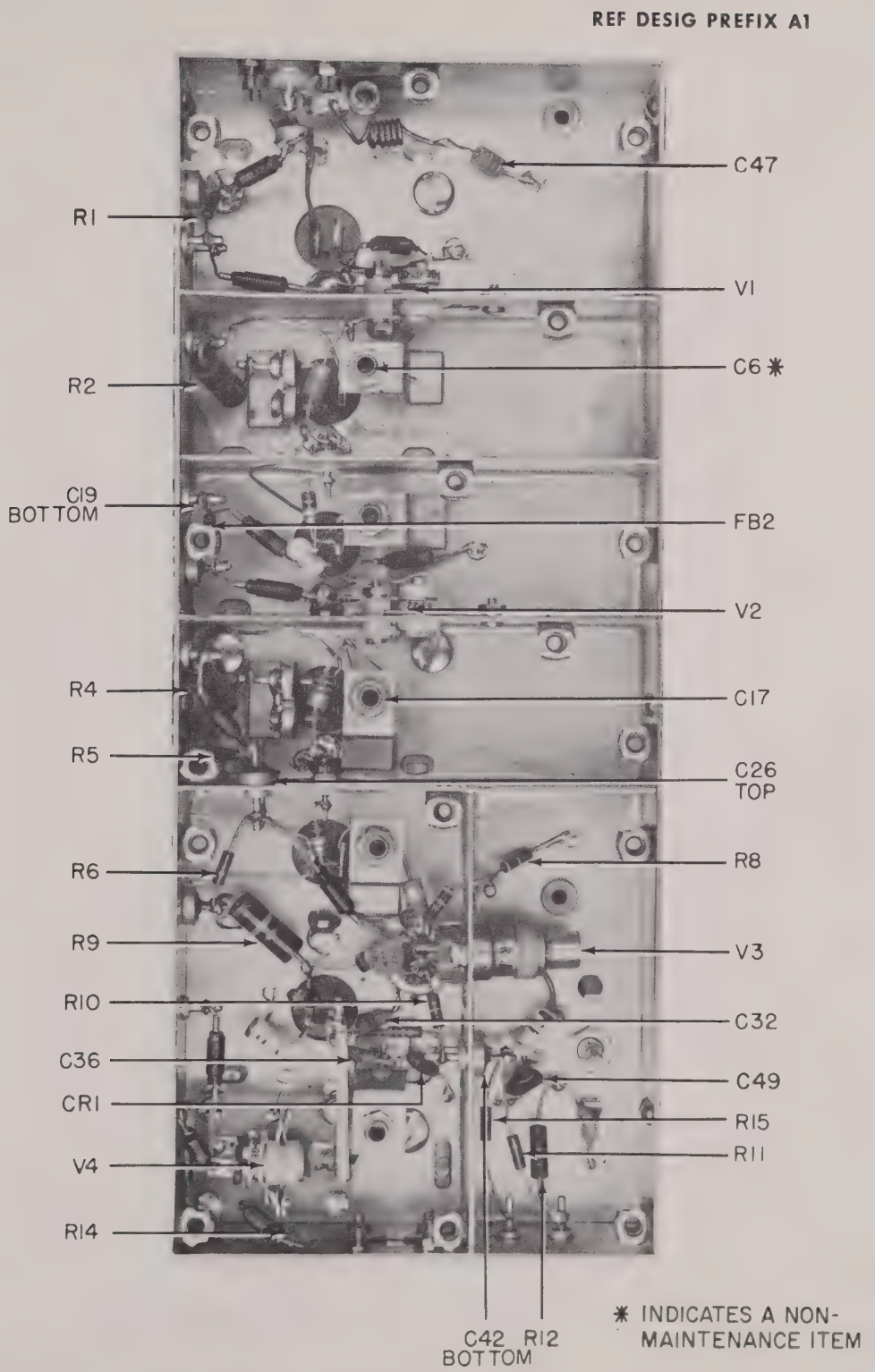



Figure 8. 235-500 mc Tuner, Component Locations, Sheet 1

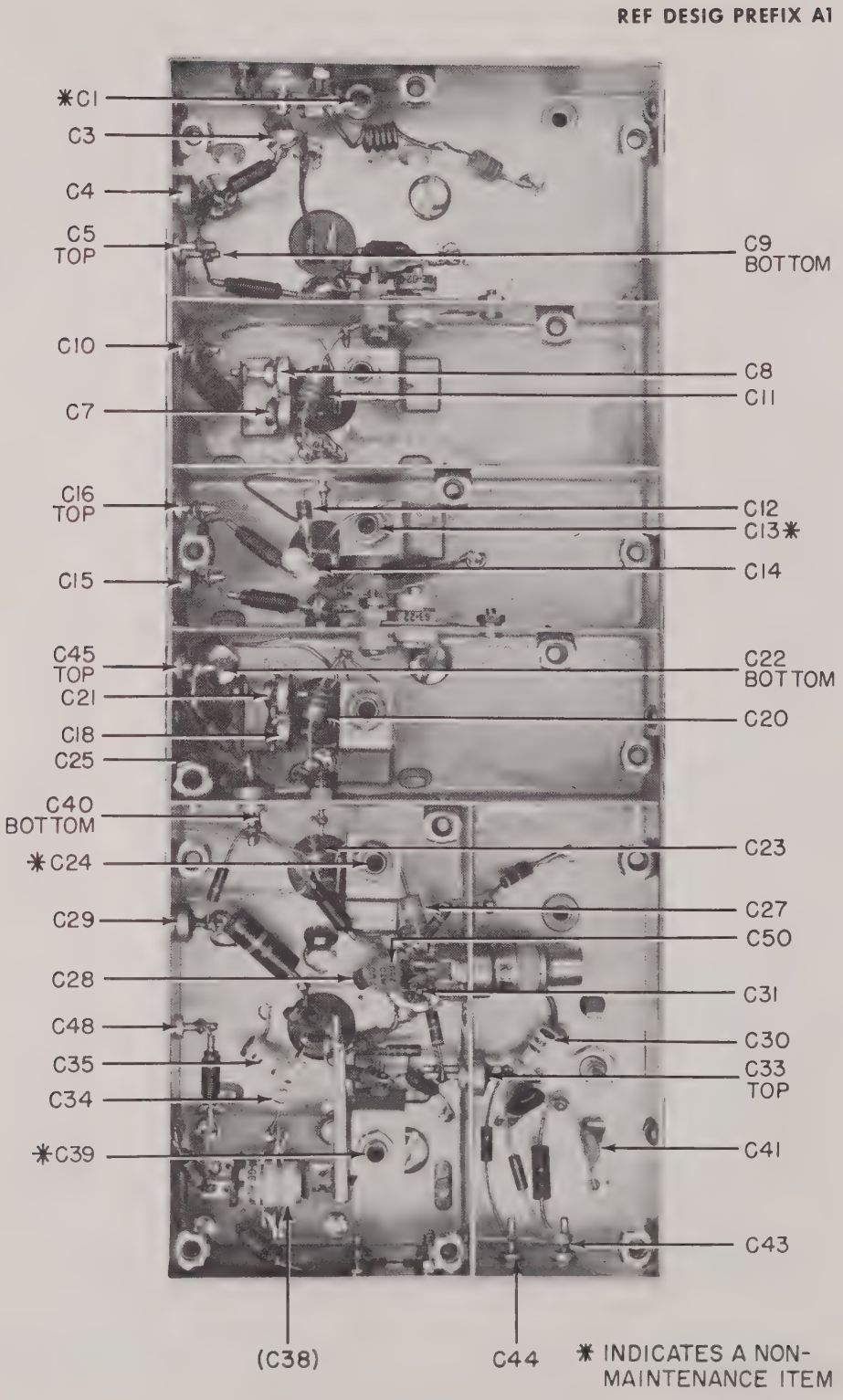



Figure 8. 235-500 mc Tuner, Component Locations, Sheet 2

REF DESIG PREFIX A1

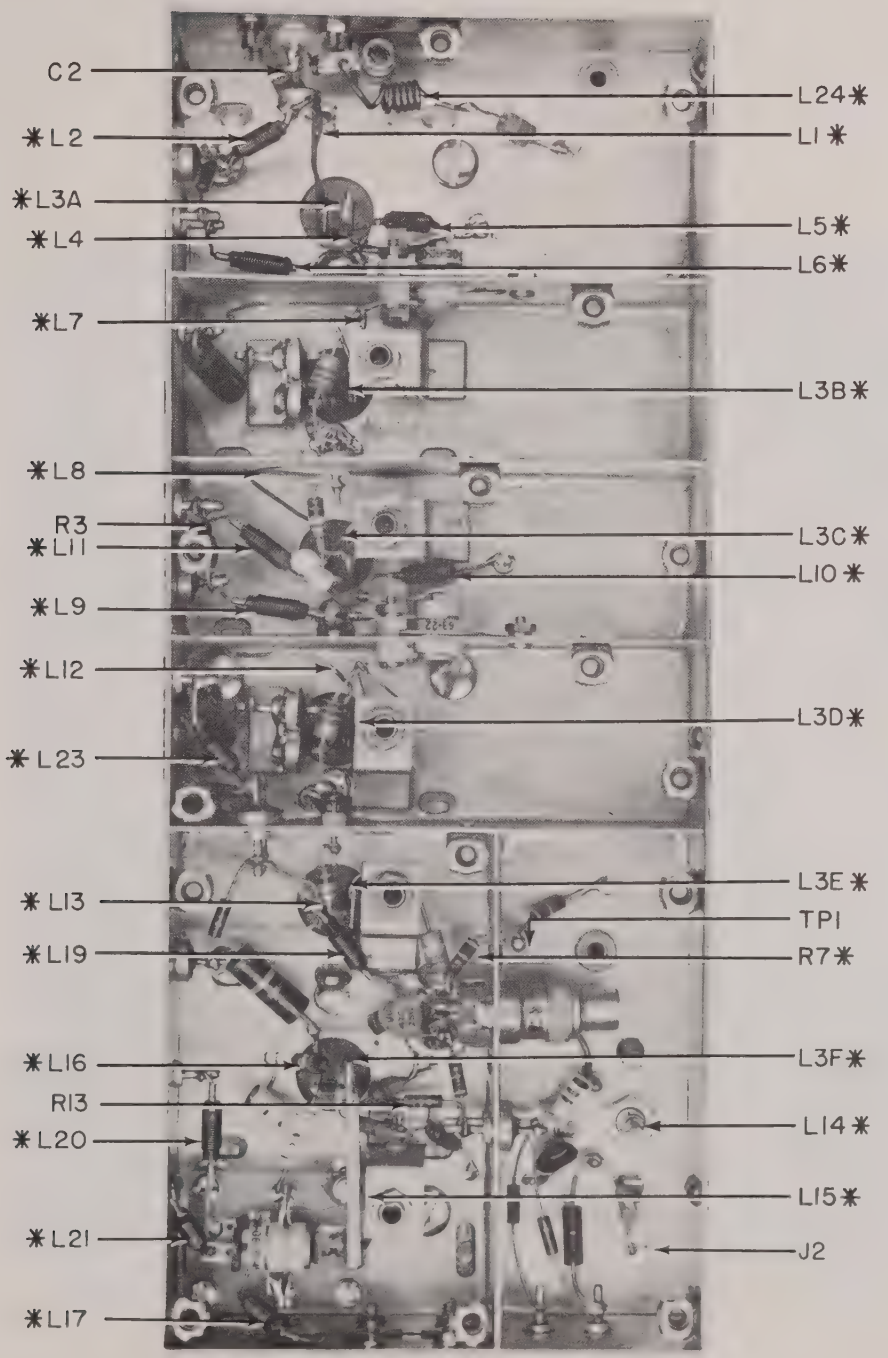



Figure 8. 235-500 mc Tuner, Component Locations, Sheet 3

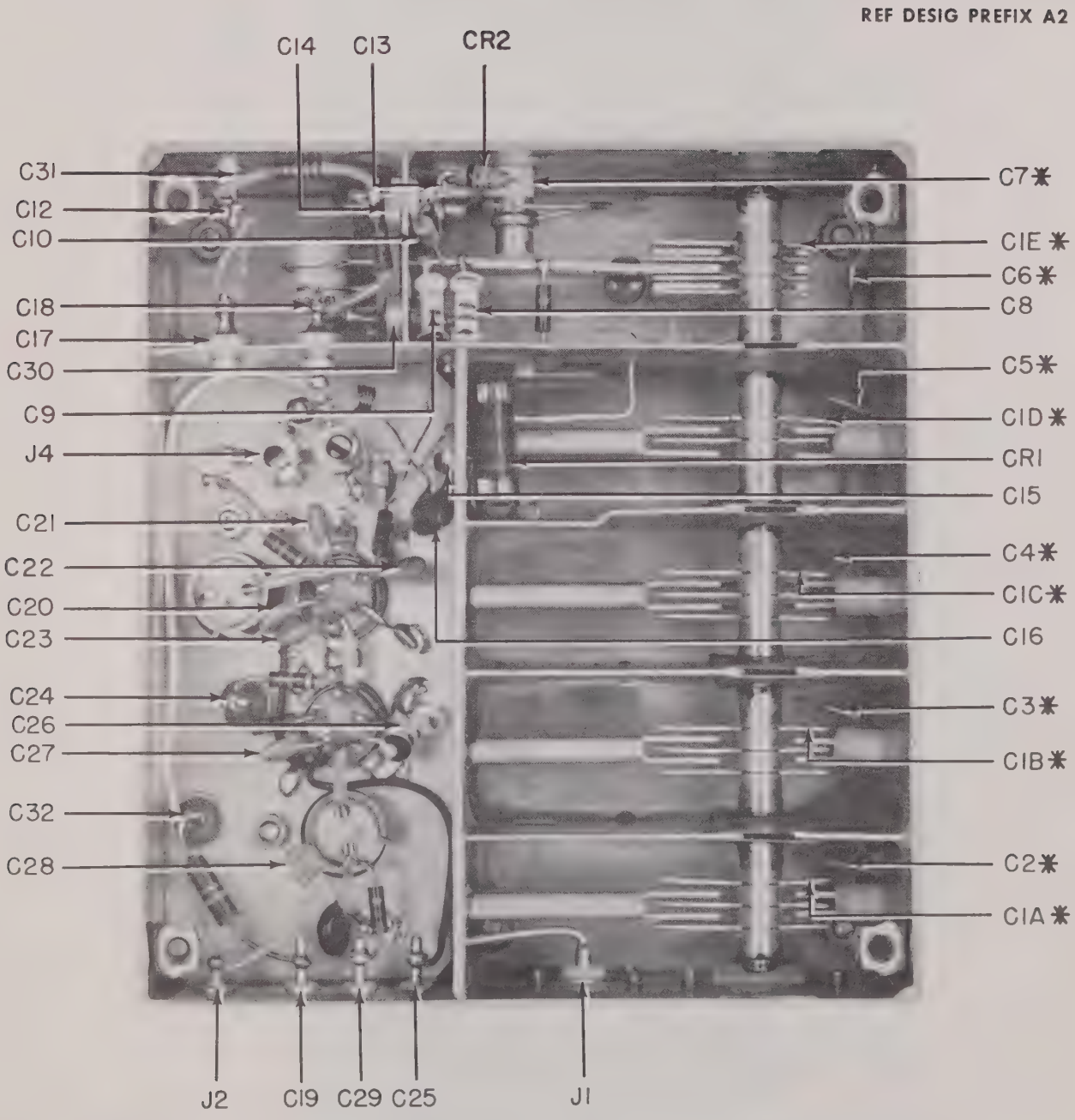
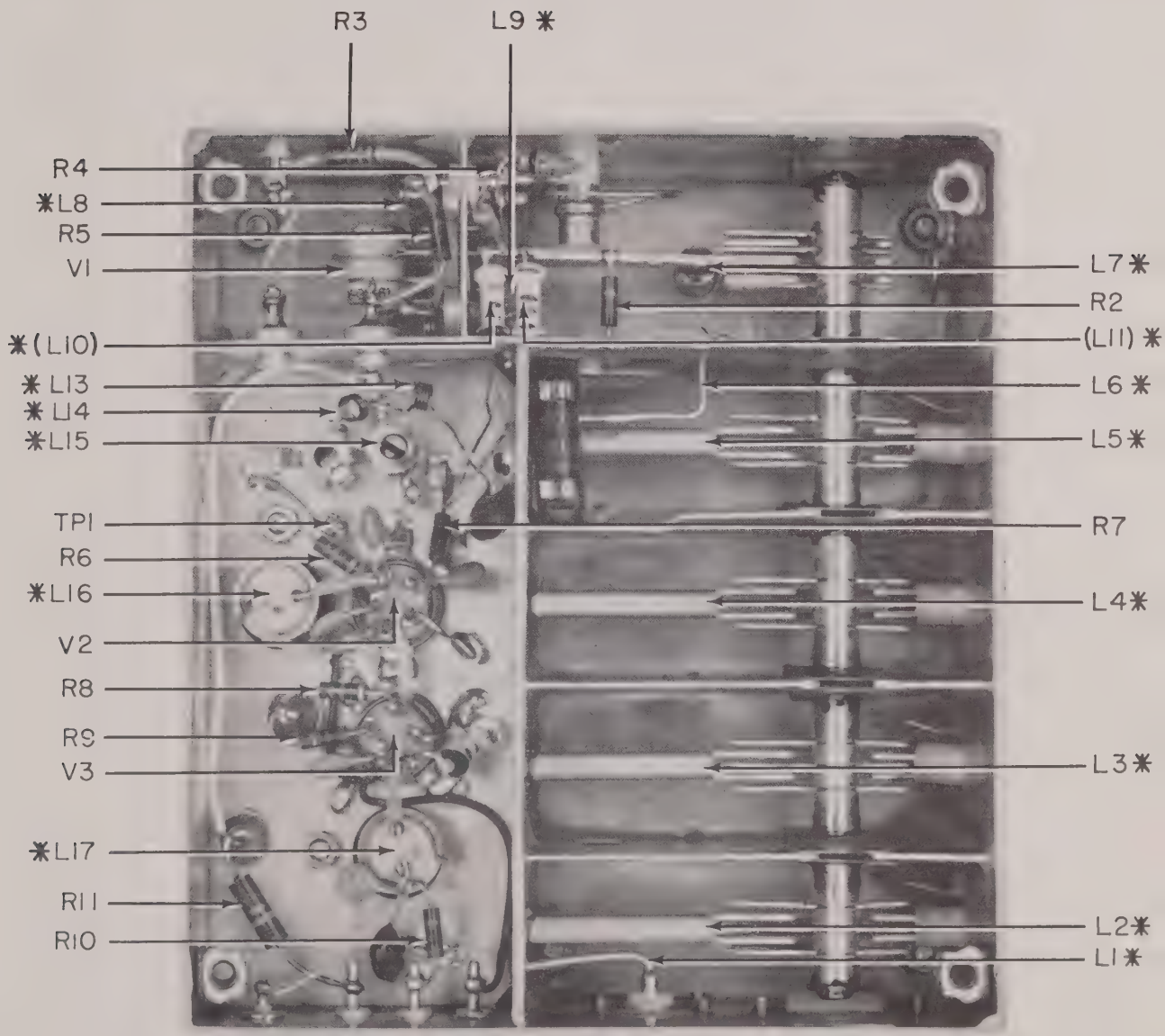



Figure 9. 490-1000 mc Tuner, Component Locations, Sheet 1

REF DESIG PREFIX A2




✱ INDICATES A NON-MAINTENANCE ITEM

Figure 9. 490-1000 mc Tuner, Component Locations, Sheet 2

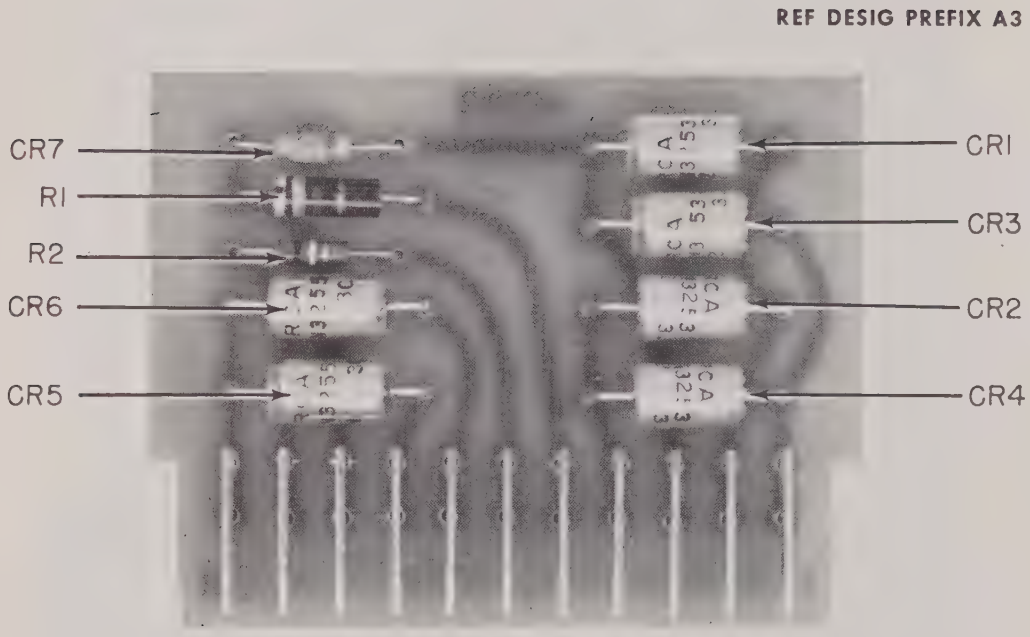



Figure 10. Power Supply Module, Component Locations

e. Check the wiring and soldering in each stage during this procedure.

CAUTION

Do not remove the shield can of the high or low band tuner until the trouble has been traced to that particular unit. Do not damage the wiring by pushing it back and forth during inspection. Be careful not to damage the frequency converter in any way.

f. Misalignment of one or more stages of the frequency converter will cause reduced output. If the local oscillator in either tuner is misaligned, the associated tuning dial will read erroneously.

g. When trouble is localized in a given stage, first test the tube if such a test is indicated; then measure the voltage; and finally measure the resistance at the tube socket of that stage.

h. Trouble in a circuit or stage may not cause changes in voltage and resistance measurements at the tube socket. The instructions included in this paragraph are merely a guide and should suggest other procedures, such as voltage and resistance measurements on individual components.

i. Remove only one tube at a time when testing. Check the number of the tube, test the tube, and if it is not defective, return it to its proper socket before another tube is removed.

j. At each step it is assumed that all previous steps were completed satisfactorily. Isolate and clear any trouble located before proceeding with any succeeding steps.

32. Signal Substitution

Set the test equipment as shown in figure 11 and observe the following procedures.

a. Set the signal generator output to 60 mc at a level of -80 dbm (22 $\mu$v).

b. Tune the receiver to the signal generator using the manual gain control mode.

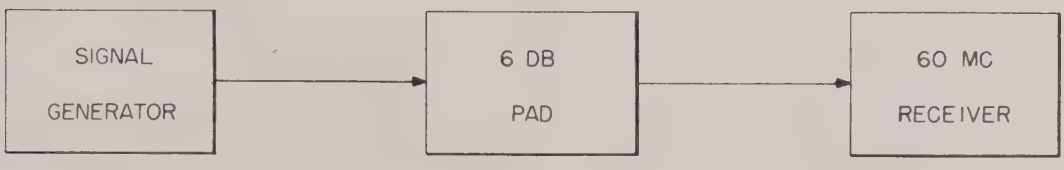



Figure 11. Test Equipment Setup, Signal Substitution Test

c. Adjust the gain of the receiver until the signal strength meter reads at a convenient mid-scale reference. If the receiver is not equipped with a signal strength meter, connect a VTVM across the AM detector load resistor and adjust the VTVM controls and the gain of the receiver for a convenient mid-scale reading. Do not disturb these settings during any subsequent steps.

d. Connect the output of the Electronic Frequency Converter CV-1750/U to the input of the 6 db pad, and connect the output of the signal generator to the input of the frequency converter as shown in figure 12.

e. Adjust the signal generator to frequencies of 250 mc, 375 mc, and 500 mc on the low band tuner of the frequency converter. For each frequency, note the signal generator output level necessary to produce the same receiver signal strength meter reference obtained in step c. above. Substract -80 dbm from these levels to obtain the gain of the frequency converter. The gain across the low band range shall be 18 db ± 6 db.

f. Connect the signal generator to the high band tuner input and make similar measurements at 500 mc, 750 mc, and 1000 mc. The gain across the high band range shall be 22 db ± 6 db.

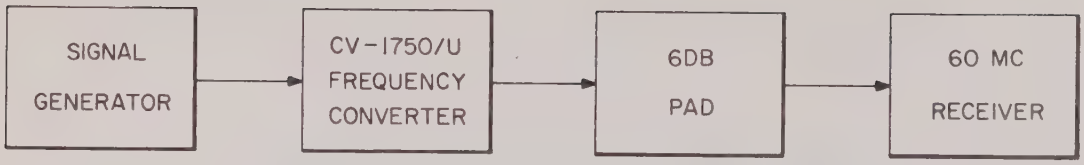



Figure 12. Equipment Setup, Gain Measurement

## Section III. Repairs and Alignment

33. General Parts Replacement Techniques

All parts in Electronic Frequency Converter CV-1750/U are readily accessible and are easily replaced if found to be faulty. The electrical components are shown in figures 4 through 10. When a switch requires replacement, mark the switch carefully with tags when numerous wires are involved to avoid an incorrest installation of the new switch. Duplicate the position of all electronic components in the high and low band tuners. The physical placement and lead length of certain components are sufficiently critical to preclude maintenance at any level. These components are noted on the illustrations, schematic diagrams, and in the Illustrated Table of Parts.

34. Adjustment of Tuning Dial Stops

The gear train mechanisms use friction drive and rely on the stops of the inductuner to halt the turning in the case of the 235-500 mc r-f tuner and on stops mounted on the gear train to halt the turning in the case of the 490-1000 mc r-f tuner. An exploded view of the gear train assembly is shown in figure 15. The tuning dials are rigidly attached to their shafts and are geared to the tuners in a manner such as to make it quite unlikely they will ever get out of position. However, if it becomes necessary to mechanically realign either dial, follow the steps outlined below.

a. 235-500 mc r-f Tuner.

(1) Release the Allen head setscrews on each side of the coupling between the gear train shaft and the inductuner shaft.

(2) Rotate the inductuner shaft to maximum clockwise position.

(3) Turn the dial until the hairline is at the mark above 500.

(4) Tighten the coupling between the gear train and the inductuner shaft.

(5) Check the operation by turning crank counterclockwise until the inductuner no longer turns. The dial should read at the fifth mark beyond 235 mc.

b. 490-1000 mc r-f Tuner.

(1) Release the Allen head setscrews on each side of the coupling between the gear train shaft and the r-f tuner shaft.

(2) Rotate the r-f tuner shaft to maximum counterclockwise position.

(3) Turn the dial until the hairline is at the mark below 490. The gear train should be stopped at the low end gear train stop at this point.

(4) Tighten the coupling between the gear train and the r-f tuner shaft.

(5) Check the operation by turning the tuning crank clockwise until the r-f tuner shaft no longer turns. The dial should read between 1000 and the mark beyond 1000.

35. Test Equipment and Special Tools Required for Alignment

The following is a chart of test equipment and special tools required for the alignment of Frequency

Converter CV-1750/U. Equivalent equipment may be substituted for any item listed.

| Test Equipment | Model |
|---|---|
| Oscilloscope | OS-46/U or AN/USM-50A |
| VTVM | TS-505/U |
| Signal Generator | AN/URM-25 |
| Sweep Generator | Telonic HD-1A |
| Signal Generator | AN/USM-44 |
| Signal Generator | AN/URM-49 |
| Radio Receiver | R-1279/URR |

36. Alignment Instructions

The alignment procedures in this book are suitable for performance in the field when making periodic performance checks, or when making adjustments after replacing tubes or components. Only those controls specifically referred to within a series of steps given for aligning a particular circuit affect the work in that circuit. Those controls not mentioned in any one series of steps may be left in any position. The alignment of this unit should be performed only with suitable equipment by technicians thoroughly familiar with their use. If the limits and tolerances specified in the following steps cannot be obtained during a field alignment, the equipment must be returned to the depot. Allow several minutes for warm-up before beginning to work.

a. Use of Marker During Alignment. A post-detection type of marker adder is recommended. However, if such a marker adder is not available, the marker generator output should be loosely coupled to the sweep generator output. This can be done by connecting the marker signal source to a turn or two of insulated wire wrapped around the sweep generator lead near the point of connection to the circuit under test, or by coupling to the sweep generator lead through a small capacitor. To insure that the addition of the marker is not affecting the response curve, disconnect the marker generator and observe that no change in the curve's shape or symmetry occurs.

b. Use of Oscilloscope During Alignment. The vertical and horizontal amplifier inputs on the oscilloscope should be set in the dc coupled mode. The dc component of the signal on the vertical input should be cancelled out by applying an equal voltage to the unused vertical differential scope input, since the dc component sometimes makes it impossible to center the signal vertically. Otherwise it will sometimes be necessary to use the ac coupled mode. A low-capacity shielded cable should be used to connect to the oscilloscope, and the shield should be grounded as closely as possible to the point to which the center conductor is connected.

36. 1 235-500 mc Tuner Alignment

Alignment of the r-f tuner should be necessary only after replacement of a tube or component. A factory alignment is necessary if satisfactory responses cannot be obtained in the field using only those adjustments directly associated with the replaced tube or component. Low band tuner component locations are shown in figure 8.

a. Initial Settings. Make the following initial settings:

(1) Set the bandswitch to the 235-500 MC position.

(2) Set the FINE TUNING control to mid-range.

b. R-f Circuit Alignment. Proceed as follows:

(1) Remove the larger of the two bottom covers from the 235-500 mc tuner.

(2) Set up the equipment as shown in figure 13.

(3) Set the frequency converter tuning dial to 500 MC and the sweep generator to 500 mc.

(4) Set the oscilloscope vertical sensitivity to 50 millivolts per centimeter.

(5) Adjust the sweep generator sweep width and oscilloscope horizontal sensitivity until a response curve is displayed on the oscilloscope screen.

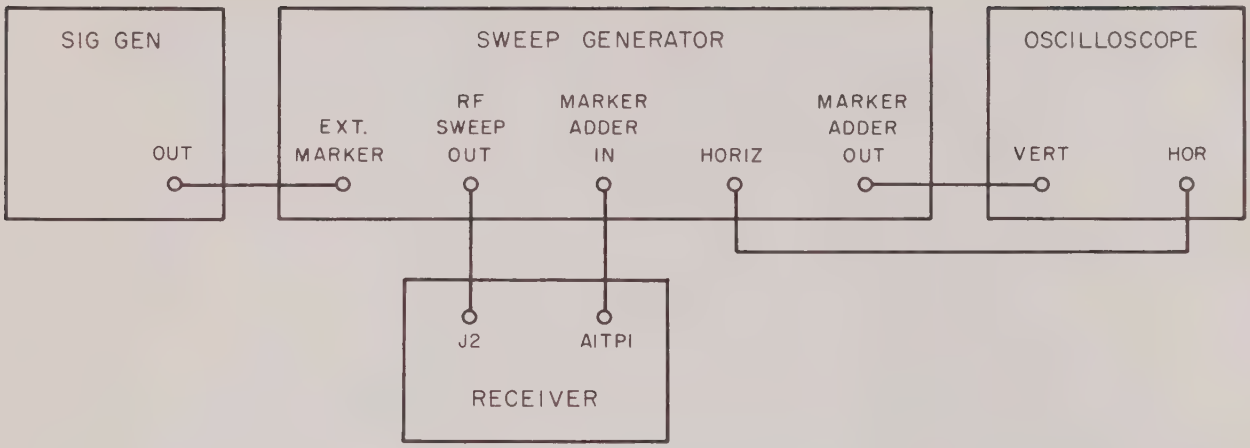



Figure 13. Equipment Setup, Tuner Alignment

(6) If A1V1 or any associated components are replaced, adjust A1C6 for maximum amplitude of a single-peak response. The response should be centered at exactly 500 mc. Typical response curves are shown in figure 14.

(7) If A1V2 or any associated components are replaced, adjust A1C13 and A1C17 for maximum amplitude of a single-peak response. The response should be centered at exactly 500 mc.

(8) If A1V3 or any associated components are replaced, adjust A1C24 for a single-peak response. The response should be centered at exactly 500 mc.

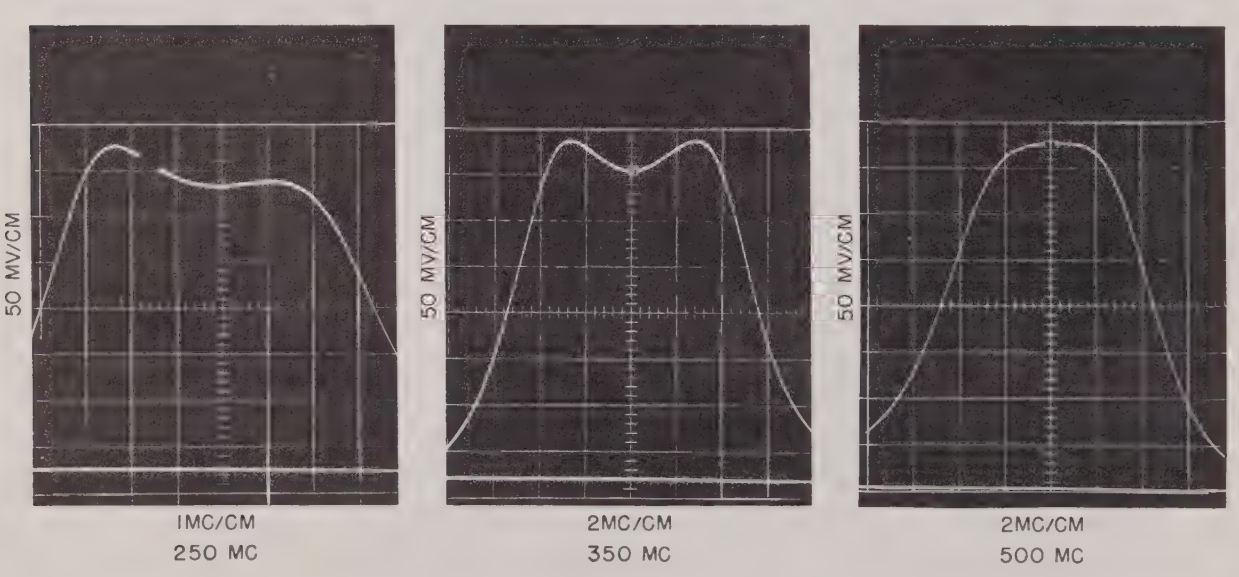



Figure 14. Typical Waveforms, Low Band Tuner Alignment

(9) Check the response at 250 mc and 350 mc. The response shape will vary slightly. The markers should be near the peak of the response curve.

(10) Replace the bottom cover.

c. Local Oscillator Alignment. Proceed as follows:

(1) Tune the receiver to exactly 60 MC, using the AN/USM-44 signal generator as a calibrating signal source.

(2) Connect the output of the frequency converter, J5, to the antenna input of the receiver.

(3) Connect the output of the AN/URM-49 signal generator to J2, 235-500 MC RF INPUT, located in the rear of the frequency converter.

(4) Adjust the signal generator to 500 mc.

(5) Adjust the signal generator output to 100 μv.

(6) Tune the frequency converter to the signal generator frequency using the receiver tuning meter to indicate proper tuning.

(7) The frequency converter tuning dial should indicate 500 mc, ± 1%.

(8) Repeat steps (2) through (5) for 350 mc. (Use the AN/USM-44 signal generator).

(9) Repeat steps (2) through (5) for 250 mc. (Use the AN/USM-44 signal generator).

(10) If any of the tuning dial indications exceed the ±1% tolerance, adjust C39. After any adjustment of C39, repeat steps (2) through (7).

d. 60 mc Mixer Adjustment.

(1) Repeat c. steps (1) through (6).

(2) Adjust the manual gain of the receiver for approximately one-half scale reading on the signal strength meter. (see par. 32).

(3) Adjust L14 for maximum reading on the receiver signal strength meter.

36.2 490-1000 MC R-F Tuner Alignment

Alignment of the tuner should be necessary only after replacement of a tube or component. Factory alignment is necessary if satisfactory responses cannot be obtained in the field using only those adjustments directly associated with the replaced tube or component. High band tuner component locations are shown in figure 9.

a. Initial Settings. Make the following initial settings:

(1) Set the bandswitch to the 490-1000 MC position

(2) Set the FINE TUNING control to mid-range.

b. R-f Circuit Alignment. The tunable r-f filter is factory aligned and in no case should a field alignment be attempted.

c. Local Oscillator Alignment. Proceed as follows:

(1) Tune the receiver to exactly 60 mc, using the AN/USM-44 signal generator as a calibrating signal source.

(2) Connect the output of the frequency converter, J5, to the antenna input of the receiver.

(3) Connect the output of the AN/URM-49 signal generator to J1, 490-1000 MC R-F INPUT.

(4) Adjust the signal generator to 1000 mc.

(5) Adjust the signal generator output to 100 μv.

(6) Tune the receiver to the signal generator frequency.

(7) The receiver tuning dial should indicate 1000 mc ± 1%.

(8) If the tuning dial indication exceeds the ± 1% tolerance, adjust C6 so that the indication is within tolerance.

(9) Repeat steps (4) through (7) for 500 mc.

(10) If the tuning dial indication exceeds the ± 1% tolerance, adjust C7 so that the indication is within tolerance.

(11) Repeat steps (4) through (7) for 750 mc.

(12) Repeat steps (4) through (7) for 1000 mc.

(13) Repeat step (8) if necessary.

d. 60-mc Mixer Alignment. The tuning inductors L15 and L16 in the 60-mc cascode amplifier are factory aligned and should not be adjusted in the field. If alignment of these inductors is necessary, it must be accomplished at the factory.

(1) Repeat c. steps (1) through (6).

(2) Adjust the receiver manual gain for approximately one-half scale reading in the signal strength meter (see paragraph 32).

(3) Adjust L17 for maximum reading on the receiver signal strength meter.

37. Maintenance of Gear Train Assembly

An exploded view of the gear train assembly is shown in figure 15.

a. Disassembly. Disassembly of the gear train assembly is accomplished as follows:

(1) Remove the band selector and tuning knobs from the front panel.

(2) Remove the four screws at each corner of the front panel, unclip the two dial indicator lamps and gently slide the front panel out and down, taking care not to damage the electrical leads on the rear of the panel.

(3) Release the band selector switch shaft and slide the switch back and out of the assembly.

(4) Remove the gear train assembly from the equipment by removing the two stand-off post screws on the cover of the low band tuner and releasing the Allen setscrews on the rear of the anti-backlash gears for both tuners. Carefully slide the assembly out from the inductuner shafts.

(5) The assembly may now be disassembled as shown in figure 15.

b. Repair and Lubrication.

(1) All defective parts may be replaced individually with the exception of the gear box assemblies which must be replaced as a unit.

(2) The gear train assembly requires no periodic lubrication. If the gears are cleaned, a light oil coating should be applied with a cloth prior to reassembly.

CAUTION

Never apply lubrication to the friction drive plates.

c. Reassembly. Reassembly is exactly the opposite of disassembly. Adjustment of tuning dial stops is described in paragraph 34.

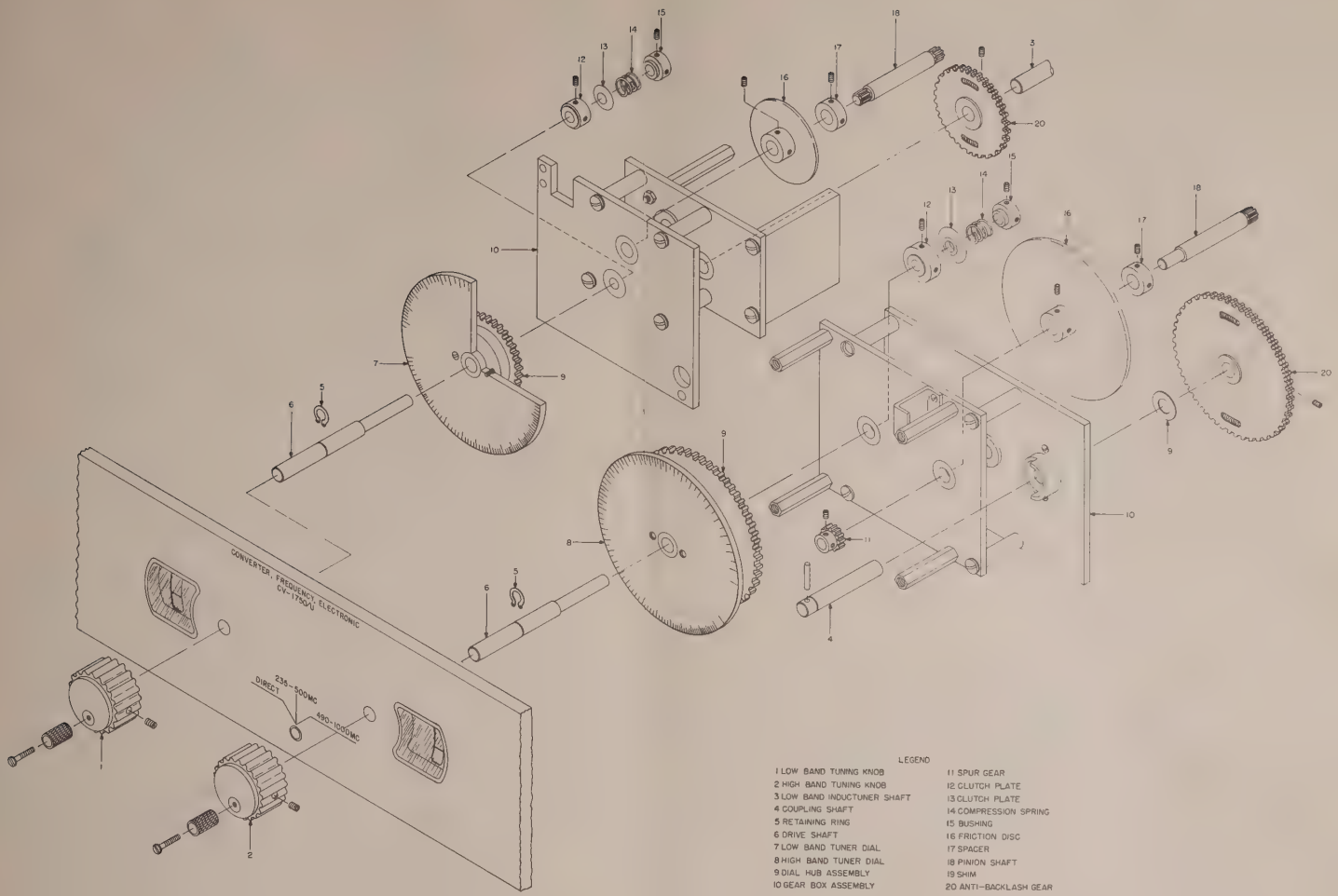



Figure 15. Gear Trains, Exploded View

# CHAPTER 5

# THEORY

## 38. General Functional Description

The Electronic Frequency Converter CV-1750/U is used to extend the range of any receiver which will tune to 60 mc to include the range of 235 mc-1000 mc. The UHF signal is converted to 60 mc and then applied to the receiver tuned to 60 mc. The frequency converter basically consists of three antenna inputs, a low band tuner, a high band tuner, and a band selector circuit. Complete schematic diagrams are shown in figures 16 through 19.

a. Band Selector. The band selector circuit connects the output of the antenna which provides signals below 235 mc to the output jack when the band selector is in the DIRECT position. In the 235-500 MC position, the circuit connects the 60-mc i-f output from the low band tuner to the output jack. The 60-mc i-f output from the high band tuner is connected to the output jack when the band selector circuit is in the 490-1000 MC position.

b. Low Band Tuner. The low band tuner consists of an r-f amplifier, a local oscillator, and a mixer.

(1) The input circuit matches the antenna impedance to the input impedance of the first stage.

(2) The local oscillator is operated in a modified Colpitts configuration. The operating frequency is maintained 60 mc above the carrier. The stability is increased by the use of a regulated filament supply. The output signal from the oscillator is coupled to the mixer.

(3) The signals from the amplifier and the oscillator are applied to the grid of the mixer to produce a 60 mc i-f. This output signal is coupled to the output of the frequency converter by a pi-network.

c. High Band Tuner. The high band tuner is composed of a quadruple-tuned preselector, a local oscillator, a crystal mixer, and a 60 mc i-f amplifier.

(1) The input signal is coupled through a preselector where tuning is accomplished by four tuned cavities which are resonated to a carrier frequency. The output of the fourth cavity is coupled to the crystal mixer.

(2) The local oscillator is operated in a grounded-plate configuration. The oscillator frequency is maintained 60 mc above the carrier and this signal is coupled to the mixer.

(3) The low-noise 60 mc i-f amplifier consists of two tubes connected in cascode configuration. Both stages are neutralized.

(4) The crystal mixer receives signals from the preselector and the local oscillator. The 60 mc i-f output from the mixer is applied to the 60-mc i-f amplifier.

d. Power Supply. The power supply operates at either 115 vac or 230 vac, 50-60/400 cps by switching the transformer primary windings from parallel to series operation. Three secondary windings supply power for the pilot lamp, the dial lamps, and most of the filaments; a full-wave rectifier circuit; and a bridge rectifier circuit.

## 39. Detailed Circuit Analysis

The operation of the circuits in the Electronic Frequency Converter CV-1750/U is described in detail for each stage.

a. Power Supply. (See fig. 16 and fig. 19) The power supply is operated from either 115 or 230 vac, 50 to 400 cps. The set-up for the desired voltage is obtained through the use of switch S2 which places the two power transformer primaries in series for 230-vac operation and in parallel for 115-vac operation. Three secondary windings are used to supply all necessary voltages to the equipment. One winding supplies 6.3 vac for the pilot light, the dial lights, and most of the filaments. A second winding supplies a full-wave rectifier whose output is RC filtered and regulated to +150 vdc by Zener diode CR8. The third winding powers a bridge rectifier whose output is -24 vdc. From the center tap on this same winding a voltage is obtained which is filtered and regulated at -6.3 vdc. To regulate the -6.3 vdc, transistor Q1 is used in a conventional series regulator configuration with

Zener diode A3CR7 providing the reference voltage. A tendency of the -6.3 vdc to vary from that value changes the effective emitter-to-base current of Q1, thereby changing the collector-to-emitter conductivity of Q1 in a manner such as to tend to restore the voltage at the Q1 emitter back to -6.3 vdc.

b. Low Band Tuner, A1 (see fig. 17)

(1) The low band tuner amplifier consists of two type 7077 ceramic triodes both in grounded-grid configuration. The input impedance at jack J2 is designed for a 50-ohm antenna. The input circuit matches this 50 ohms to the input impedance of the first stage, V1. Interstage coupling and coupling from the second stage to the mixer is by means of double-tuned circuits. Tuning within the amplifier is by means of inductors L3A, L3B, L3C, L3D, and L3E, five sections of a six-section inductuner. To keep the two stages stabilized, the cathodes are returned to ground through a -6.3 vdc, regulated source. The connection of their cathodes to this source is through two 1000-ohm resistors, R1 and R3, which provide dc degeneration to help normalize the effect of tube variations.

(2) The low band tuner local oscillator, V4, is a type 7486 triode operated in a modified Colpitts configuration. The tank circuit is tuned by inductor L3F, a section of the inductuner. The operating frequency is kept 60 mc above the carrier. Oscillator stability is increased by the use of a regulated -6 vdc filament supply. The oscillator's signal is coupled to the mixer through capacitor C28.

(3) Fine tuning is accomplished by a voltage-variable capacitor, CR1, which varies the shunt capacitance of the tank circuit. The voltage-variable capacitor is a semi-conductor device whose capacitance varies with the voltage across it. The capacitance of CR1 is controlled by a dc voltage which reaches it through resistors R13 and R15. The level of the voltage is controlled by the fine tuning potentiometer, R9, which is in series with resistor R8 between +150 vdc and ground.

(4) The low band mixer, V3, is a type 7587 Nuvistor tetrode. Both the signal from the r-f amplifier and the local oscillator output are applied to its grid. The two signals are mixed to produce a 60-mc i-f. An oscilloscope can be connected at test point TP1 in the grid circuit to check oscillator injection and also to check r-f tuning and response. The mixer output signal is coupled to the output via a pi-network. This pi-network lowers the output impedance to 50 ohms.

c. High Band Tuner, A2. (see fig. 18)

(1) In the high band r-f input circuit, L1 presents an impedance designed for a 50-ohm antenna across the entire band. From L1 the signal is coupled through the quadruple-tuned preselector. Tuning is accomplished by four tuned cavities. The signal passes from cavity to cavity through coupling irises. The cavities are resonated to a carrier frequency by changing the capacitance between the inner conductor and the wall. The action effectively produces quarter-wave tuning and is analogous to coaxial-line cavity tuning in which the resonant frequency is determined by the position of the plunger. From the fourth cavity, inductor L6 couples the signal to the crystal mixer.

(2) The high band tuner local oscillator, V1, is a type 7486 ceramic planar triode operated in a grounded-plate configuration. The tank circuit is a length of transmission line. Capacitor C1E, ganged with the high tuning control, loads the transmission line so as to make its effective length one-half wavelength at the desired frequency. The oscillator is operated at a frequency 60 mc above

the carrier.

(3) Fine tuning is accomplished by the use of voltage-variable capacitor CR2 in the same manner fine tuning is obtained in the low band tuner. Oscillator signal injection to the mixer is accomplished by inductor L6 whose lower end reaches into the chamber in which the oscillator stage is mounted.

(4) The high band tuner contains a low-noise 60-mc i-f amplifier which consists of two type 6CW4 tubes, V2 and V3. They are connected in cascode configuration. The two stages are neutralized by the adjustment of inductor L16.

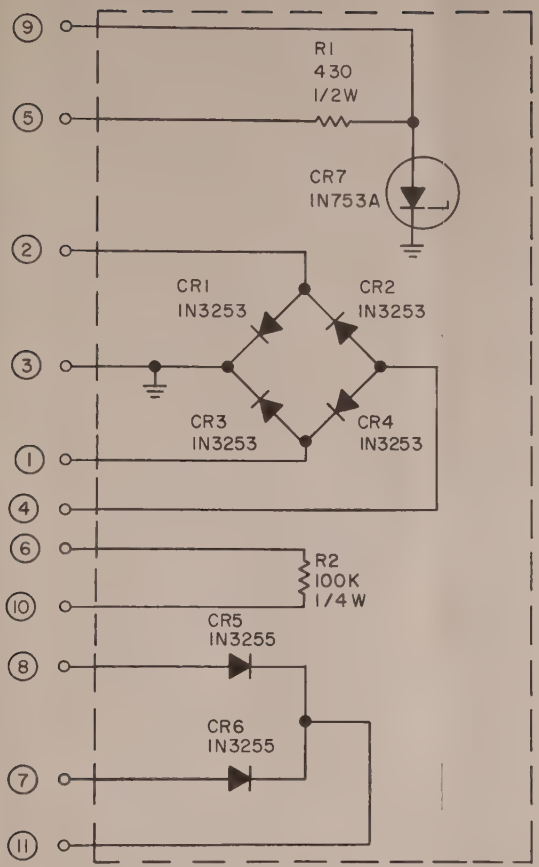
(5) The high band tuner mixer, CR1, is a type 1N82A crystal diode. Through inductor L6 it receives both the incoming carrier and the oscillator injection signal. Jack J4 is present to facilitate the checking of the oscillator injection level for field maintenance.

d. Band Selector. (see fig. 19)

(1) The band selector circuit consists of a four-pole, three-position switch S3, and two relay-controlled coaxial switches, K1 and K2. The two coaxial switches are controlled by a -24 vdc applied to them through S3A. When S3 is at the DIRECT position, neither relay is actuated, a condition causing the J3 input to be coupled to the output, J5, through jacks J8 and J9. When S3 is at the low position, K2 is actuated and K1 is not. This causes the low band tuner output to be coupled to the output, J5. When S3 is at the high position, both K1 and K2 are actuated. This causes the high band tuner output to be coupled to the output, J5.

(2) While bringing about the appropriate coupling to the output, S3 also places the proper tuner in operation. When S3 is at the low position, the low band tuner is placed in operation by switch section S3B which applies -6.3vdc to it and section SC3 which applies a regulated +150 vdc to it. When S3 is at the high position, the high band tuner is placed in operation by switch section S3C which applies +150 vdc to it.

REF DESIG PREFIX A3




NOTES:
1. ENCIRCLED NUMBERS ARE MODULE PIN NUMBERS.

Figure 16. Power Supply Module, Schematic Diagram

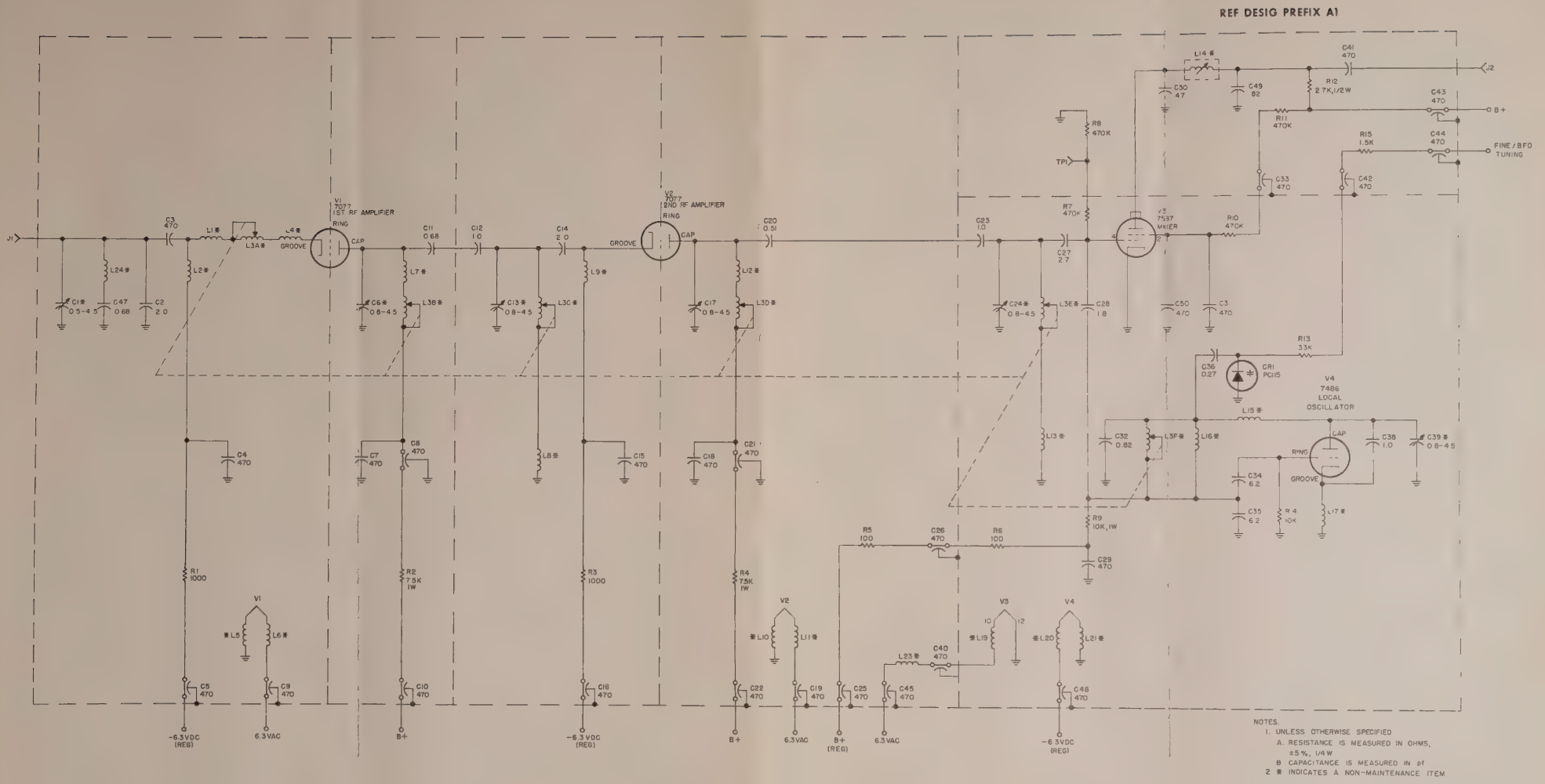
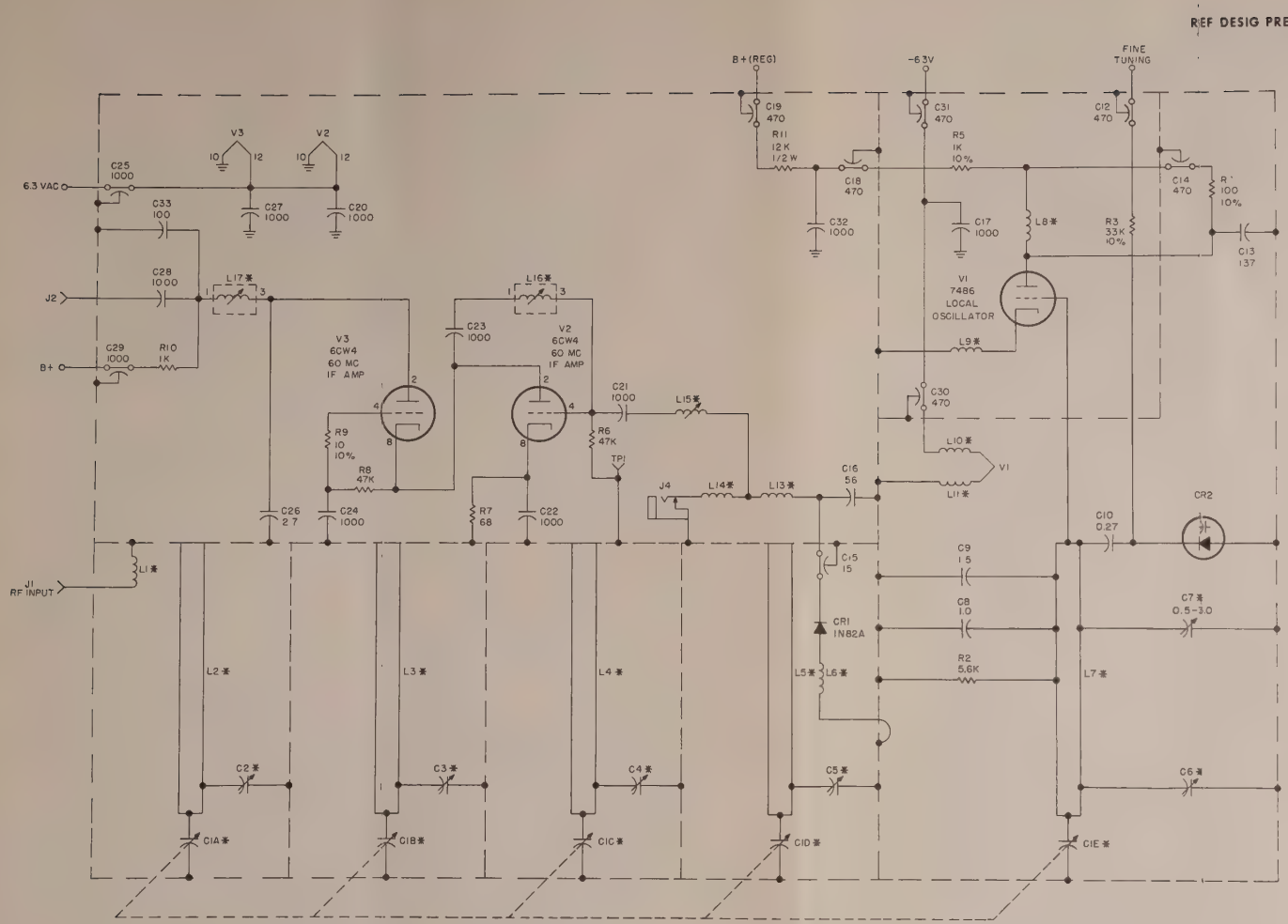



Figure 17. 235-500 mc Tuner, Schematic Diagram




NOTES
1. UNLESS OTHERWISE SPECIFIED
   A. RESISTANCE IS MEASURED IN OHMS, ±5%, 1/4 W
   B. CAPACITANCE IS MEASURED IN pf
2 * INDICATES A NON-MAINTENANCE ITEM

Figure 18. 490-1000 mc Tuner, Schematic Diagram

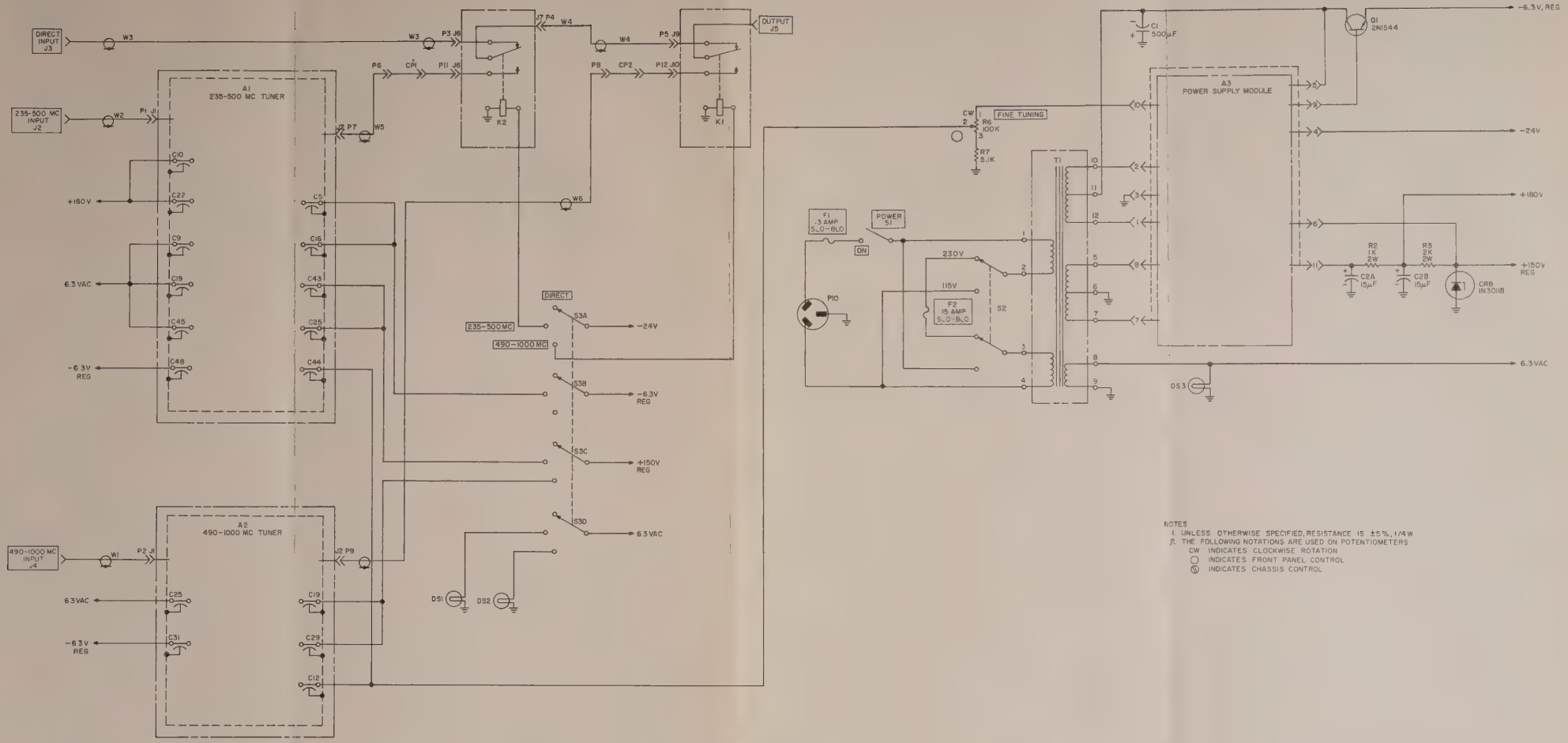



Figure 19. Electronic Frequency Converter CV-1750/U, Main Chassis Schematic Diagram

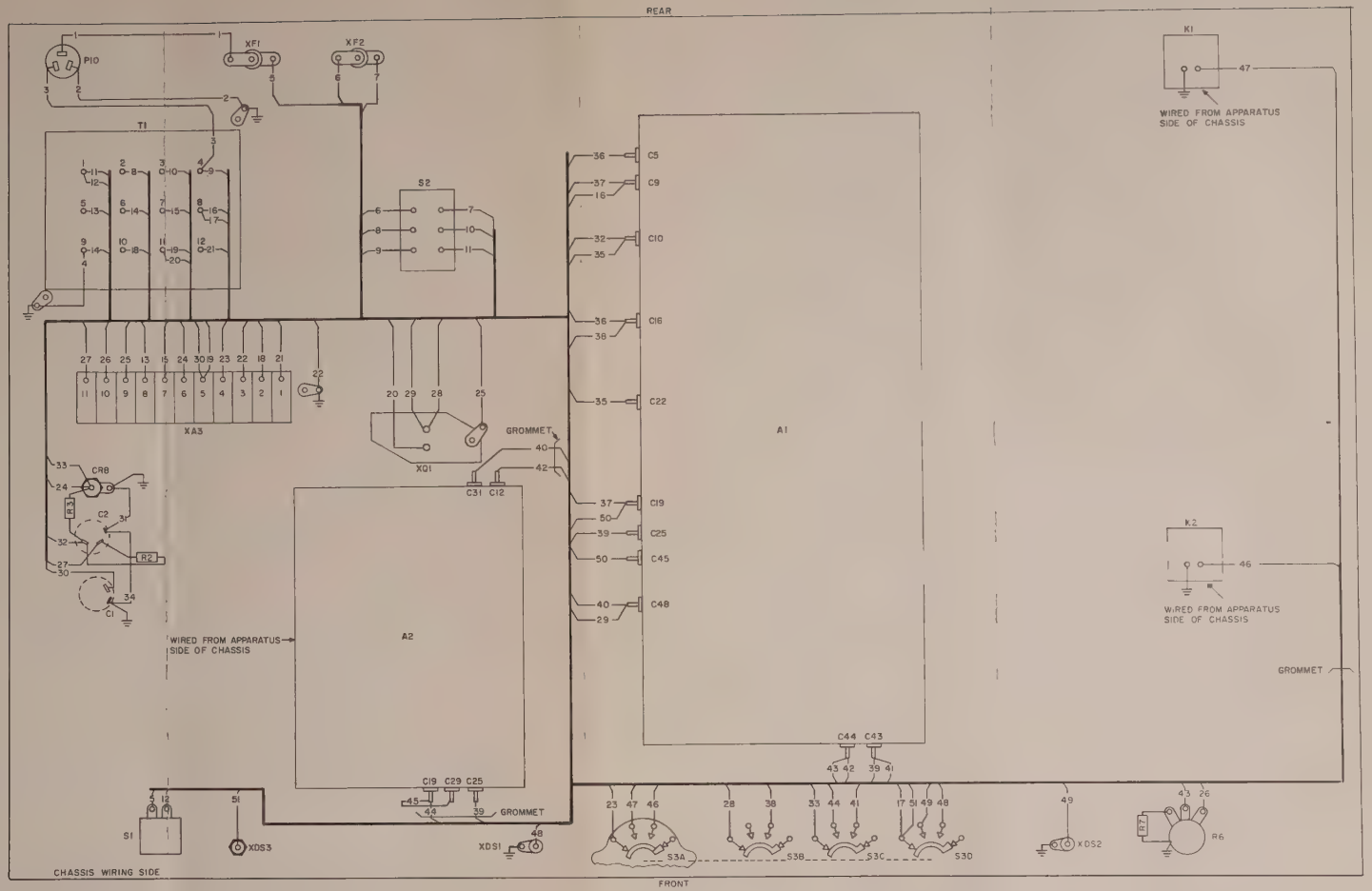



Figure 20. Electronic Frequency Converter CV-1750/U, Wiring Diagram

# CHAPTER 6

# SHIPMENT AND LIMITED STORAGE

## Section I. Shipment and Limited Storage

### 40. Repacking for Shipment or Limited Storage

a. The exact procedure in repacking for shipment or limited storage depends upon the material available and the conditions under which the equipment is to be shipped or stored. Always insure that the equipment is repacked to withstand harsh treatment. Refer to paragraph 8 and reverse the instructions given in that paragraph.

b. Whenever practicable, place a dehydrating agent such as silica gel around the case. Protect the case with a waterproof paper barrier. Seal the seams of the paper barrier with waterproof sealing compound or tape. Pack the protected case in a padded wooden case or a fiberboard box, providing at least 3 inches of excelsior padding or some similar material between the paper barrier and the packing case.

c. The packing case should be marked: FRAGILE-ELECTRONIC EQUIPMENT INSIDE, and the shipping destination of the equipment should be clearly indicated.

## Section II. Demolition of Material to Prevent Enemy Use

### 41. Authority for Demolition

Demolition of the equipment will be accomplished only upon the order of the commander. The destruction procedures outlined in paragraph 42 will be used to prevent further use of the equipment.

### 42. Methods of Destruction

Use any or all of the following methods to destroy the equipment.

a. Smash. Smash the controls, tubes, coils, relays, switches, capacitors and transformers; use sledges, axes, handaxes, pickaxes, hammers, or crowbars.

b. Cut. Cut all cables and cords and slash the wiring on the components; use axes, handaxes, or machetes.

c. Burn. Burn cords and technical manuals; use gasoline, kerosene, oil, flame-throwers, or incendiary grenades.

d. Bend. Bend panels and cabinets.

WARNING

Be extremely careful with explosives and incendiary devices. Use these items only when the need is urgent.

e. Explode. If explosives are necessary, use firearms, grenades, or TNT.

f. Dispose. Bury or scatter the destroyed parts in slit trenches or foxholes, or throw them into streams.

# CHAPTER 7

# IDENTIFICATION TABLE OF PARTS

## 43. Unit Numbering Method

The unit numbering method of assigning reference designations (electrical symbol numbers) has been used to identify assemblies, subassemblies (and modules), and parts. An example of the unit method follows:

| | |
|---|---|
| Subassembly Designation | Class and No. of item |
| Read from right to left as: | First (1) resistor (R) of first (1) subassembly (A) |

As shown on the main chassis schematic, components which are an integral part of the main chassis have no subassembly designation.

## 44. Reference Designation Prefix

Partial reference designations have been used on the equipment and on the illustrations in this manual. The partial reference designations consist of the class letter(s) and identifying item number. The complete reference designations may be obtained by placing the proper prefix before the partial reference designations. Prefixes are provided on drawings and illustrations following the notation "REF DESIG PREFIX".

## 45. Repair Parts List

The Identification Table of Parts presented on the following pages lists the repair parts for the frequency converter. Those parts which cannot be replaced at any echelon of maintenance are denoted in the table by an asterisk.

| CONTRACTOR: COMMUNICATION ELECTRONICS INCORPORATED | | | | | | CONTRACT NO.: DA-36-039-AMC-02918(E) | | |
|---|---|---|---|---|---|---|---|---|
| REF. SYM OR PART NUMBER (1) | NAME OF PARTS OR DESCRIPTION (2) | FUNCTION (3) | ALL SYMBOLS AND PART NUMBERS INVOLVED (4) | JAN OR MIL TYPE NUMBER (5) | MAN-AGER (6) | FEDERAL STOCK NUMBER (7) | TOTAL NUMBER PARTS PER END ITEM (8) | REF FIGURE (9) |
| Figure 1 | CONVERTER, FREQUENCY, ELECTRONIC, CV-1750/U: Aluminum chassis and front panel; grey enamel finished front panel with black, photo-etched overlay; 3.5 in. h by 19 in. w by 12 in. d overall dimensions; 235 to 1000 mc. Incoming frequency range, 60 mc resultant frequency; requires either 115V or 230V, 50-400 cycles, single phase power source: Communication Electronics, Inc. | Intercept signals propagated by a transmitter with the effective tuning range of 235-1000 mc and convert such detected signals to a 60 mc output. Principal use is to extend effective tuning range of any receiver capable of tuning to 60 mc. | | | | 5820-070-7967 | | |
| Figure 8 A1 | AMPLIFIER, RADIO FREQUENCY: Aluminum chassis, silver plate, gold flashed, 3 in. h by 4 in. w by 9.75 in. d overall dimensions; 235-mc to 500 mc input frequency range; 60 mc output frequency; 50 ohm input and output impedance: Communication Electronics, Inc. type 7122 | Tunes the 235-500 mc range and converts received signals to 60 mc | A1 | | | | 1 | 6 |
| A1C1* | CAPACITOR, variable, ceramic dielectric: 0.5-4.5 pf, 500 wvdc, Cambridge Thermionics Corp. #CST-6. | Padder capacitor for C2. | A1C1 | | | | 1 | 8 |
| A1C2 | CAPACITOR, fixed, ceramic dielectric: 2.0 pf, tolerance ±.25 pf, 500 wvdc; NPO temperature coefficient; .200 in. dia. by 400 in. lg., w/radial leads 1.25 in. lg; uninsulated case; Erie Technological Products, Inc. #301-000-COKO-209C. | Tuned to the input signal. | A1C2, A1C14, A1C30 | | | | 3 | 8 |

* Indicates a non-maintenance item.

| CONTRACTOR: COMMUNICATION ELECTRONICS INCORPORATED | CONTRACT NO.: DA-36-039-AMC-02918(E) |
|---|---|

| REF SYM OR PART NUMBER (1) | NAME OF PARTS OR DESCRIPTION (2) | FUNCTION (3) | ALL SYMBOLS AND PART NUMBERS INVOLVED (4) | JAN OR MIL TYPE NUMBER (5) | MAN-AGER (6) | FEDERAL STOCK NUMBER (7) | TOTAL NUMBER PARTS PER END ITEM (8) | REF FIGURE (9) |
|---|---|---|---|---|---|---|---|---|
| A1C3 | CAPACITOR, fixed, ceramic dielectric: 470 pf, 20% tolerance 500 wvdc; single-ended standoff, rivet mount, .281 in. dia by .437 in. lg.; Allen Bradley Co. #SS5A-4712 | Coupling capacitor blocks input dc from reaching cathode of V1. | A1C3, A1C4, A1C7, A1C15, A1C18, A1C29, A1C31, A1C50 | | CU | 5910-956-8406 | 8 | 8 |
| A1C4 | CAPACITOR; same as A1C3 | AC bypass capacitor for 6.3V regulated input. | | | | | | 8 |
| A1C5 | CAPACITOR, fixed, ceramic dielectric: 470 pf, 20% tolerance 500 wvdc; double-ended feedthru, rivet mount, .281 in. dia. by .671 in. lg., Allen Bradley Co. #FA5C-4712 | Feedthru for 6.3V dc regulated dc and provides ac bypass for same. | A1C5, A1C8, A1C9, A1C10, A1C16, A1C19, A1C21, A1C22, A1C25, A1C26, A1C33, A1C40, A1C42, A1C43, A1C44, A1C45, A1C48 | | CU | 5910-956-8401 | 17 | 8 |
| A1C6* | CAPACITOR, variable, glass dielectric: 0.5-4.5 pf, 1000 wvdc; Roanwell Corp. #MG-1305 | Provides variable tuning for output of V1 in conjunction with L7 and L3B. | A1C6, A1C13, A1C17, A1C24, A1C39 | | | | 5 | 8 |
| A1C7 | CAPACITOR; same as A1C3 | AC bypass for B plus input. | | | | | | 8 |
| A1C8 | CAPACITOR; same as A1C5 | Feedthru for B plus input and AC bypass. | | | | | | 8 |
| A1C9 | CAPACITOR; same as A1C5 | Feedthru for 6.3 vac filament input | | | | | | 8 |
| A1C10 | CAPACITOR; same as A1C5 | Feedthru for B plus input and AC bypass | | | | | | 8 |

* Indicates a non-maintenance item

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|---|---|
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| REF. SYM. OR PART NUMBER (1) | NAME OF PARTS OR DESCRIPTION (2) | FUNCTION (3) | ALL SYMBOLS AND PART NUMBERS INVOLVED (4) | JAN OR MIL TYPE NUMBER (5) | MAN-AGER (6) | FEDERAL STOCK NUMBER (7) | TOTAL NUMBER PARTS PER END ITEM (8) | REF FIGURE (9) |
|---|---|---|---|---|---|---|---|---|
| A1C11 | CAPACITOR, fixed, ceramic dielectric: 0.68 pf, tolerance 10% 500 wvdc; .156 in. dia. by .218 in. lg., w/axial leads; Quality Components, Inc. #QC | Used in conjunction with C12 to provide overcoupling of the output signal from V1. | A1C11, A1C47 | | | | 2 | 8 |
| A1C12 | CAPACITOR, fixed, ceramic dielectric: 1.0 pf, tolerance 10% 500 wvdc; .109 in. dia. by .218 in. lg., w/axial leads; Quality Components, Inc. #MC | Used in conjunction with C11 to provide coupling to C14. | A1C12, A1C23 | | | | 2 | 8 |
| A1C13* | CAPACITOR; same as A1C6 | Used in conjunction with L8 to form variable tuned circuit at high frequency end of tuner. | | | | | | 8 |
| A1C14 | CAPACITOR; same as A1C2 | DC blocking capacitor preceding cathode of V2. | | | | | | 8 |
| A1C15 | CAPACITOR; same as A1C3 | AC bypass for cathode of V2. | | | | | | 8 |
| A1C16 | CAPACITOR; same as A1C5 | Feedthru capacitor for dc input and also an AC bypass capacitor | | | | | | 8 |
| A1C17 | CAPACITOR; same as A1C6 | Variable tuning for L12 at high frequency end of tuner | | | | | | 8 |
| A1C18 | CAPACITOR; same as A1C3 | AC bypass for B plus input to V2 | | | | | | 8 |
| A1C19 | CAPACITOR; same as A1C5 | Feedthru capacitor for filament input to V2 | | | | | | 8 |

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|---|---|---|---|---|---|---|---|---|
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| A1C20 | CAPACITOR, fixed, ceramic, dielectric: 0.51 pf, tolerance 10% 500 wvdc; .156 in. dia. by .218 in. lg., w/axial leads; Quality Components, Inc. #QC | Used in conjunction with C17, L12, and L3D to provide overcoupling of the output signal from V2. | A1C20 | | | | | 8 |
| A1C21 | CAPACITOR; same as A1C5 | Feedthru capacitor for B plus to the plate of V2. | | | | | | 8 |
| A1C22 | CAPACITOR; same as A1C5 | AC bypass. | | | | | | 8 |
| A1C23 | CAPACITOR; same as A1C12 | Part of waveshaping network at the grid of V3. | | | | | | 8 |
| A1C24* | CAPACITOR; same as A1C6 | Forms a tuned circuit with L13 when L3E is at the upper extreme of rotation. Provides tuning at upper end of tuner reception. | | | | | | 8 |
| A1C25 | CAPACITOR; same as A1C5 | Feedthru capacitor for B plus to the plate of V4. Also provides AC bypass. | | | | | | 8 |
| A1C26 | CAPACITOR; same as A1C5 | Feedthru capacitor for B plus to the plate of V4. Also provides AC bypass. | | | | | | 8 |
| A1C27 | CAPACITOR, fixed, ceramic dielectric: 2.7 pf, tolerance ±.25 pf, 500 wvdc; NPO temp. coefficient .200 in. dia. by .400 in. lg., w/ radial leads 1.25 in. lg.; uninsulated case; Erie Technological Products, Inc. #301-000-COJO-279C | DC blocking capacitor preceding V3 and assists in forming the overcoupled waveform at the input to V3. | A1C27 | | | | 1 | 8 |

* Indicates a non-maintenance item.

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|---|---|---|---|---|---|---|---|---|
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| A1C28 | CAPACITOR, fixed, ceramic, dielectric: 1.8 pf, tolerance ±.25 pf, 500 wvdc; NPO temp. coefficient .200 in. dia. by .400 in. lg., w/ radial leads 1.25 in. lg. uninsulated case; Erie Technological Products, Inc. #301-000-COKO-189C. | Coupling capacitor providing the correct value of injection voltage from the oscillator and blocks B plus on the grid of V3. | A1C28 | | | | | 8 |
| A1C29 | CAPACITOR; same as A1C3 | Standoff capacitor providing low AC bypass for B plus input. | | | | | | 8 |
| A1C30 | CAPACITOR; same as A1C2 | In conjunction with L14 and C49, it forms a pi-network filter. | | | | | | 8 |
| A1C31 | CAPACITOR; same as A1C3 | Provides filtering for screen grid of V3 in conjunction with C50. | | | | | | 8 |
| A1C32 | CAPACITOR, fixed, ceramic, dielectric: 0.82 pf, tolerance 10% 500 wvdc; .109 in. dia. by .218 in. lg., w/axial leads; Quality Components, Inc. #MC | Forms a portion of the tuned circuit of V4. | A1C32 | | CU | 5910-899-2392 | 1 | 8 |
| A1C33 | CAPACITOR; same as A1C5 | Feedthru capacitor for B plus to screen grid of V3. | | | | | | 8 |
| A1C34 | CAPACITOR, fixed, ceramic dielectric: 1.0 pf, tolerance, &.1 pf, 500 wvdc; NPO temp. coefficient .200 in. dia. by .400 in. lg., w/ radial leads 1.25 in. lg. uninsulated case; Erie Technological Products, Inc. #301-000-COKO-109B. | Feedthru capacitor for B plus to screen grid of V3. | A1C34 | | | | 1 | 8 |

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|---|---|---|---|---|---|---|---|---|
| A1C35 | CAPACITOR, fixed, ceramic, dielectric: 6.2 pf, tolerance ±.5 pf 500 wvdc; N750 temp. coefficient; .200 in. dia. by 400 in. lg., w/ radial leads 1.25 in. lg., uninsulated case; Erie Technological Products, Inc. # 301-000-U2JO-629D. | Feedthru capacitor for B plus to screen grid of V3. | A1C35 | | | | 1 | 8 |
| A1C36 | CAPACITOR, fixed, ceramic, dielectric: 0.27 pf, tolerance 10% 500 wvdc; .109 in. dia. by .218 in. lg., w/axial leads; Quality Components, Inc. #MC | Coupling capacitor to the tuned circuit for the BFO/FINE TUNING voltage. | A1C36 | | | | 1 | 8 |
| A1C37 | NOT USED | | | | | | | |
| A1C38 | CAPACITOR, fixed, ceramic, dielectric: 1.0 pf, tolerance ±.1 pf 500 wvdc; NPO temp. coefficient; .200 in. dia. by .400 in. lg., w/ radial leads 1.25 in. lg., uninsulated case; Erie Technological Products, Inc. #301-000-COKO-109B. | Feedback capacitor. | A1C38 | | | | 1 | 8 |
| A1C39* | CAPACITOR; same as A1C6 | Capacitor tuning for the tuned circuit of V4. | | | | | | 8 |
| A1C40 | CAPACITOR; same as A1C5 | Feedthru capacitor for filament of V3. | | | | | | 8 |
| A1C41 | CAPACITOR, fixed, ceramic, dielectric: 470 pf, 20%, 1000 wvdc; .285 in. dia. disc type, 1.5 in. leads w/.25 in. spacing; Radio Materials Co. #B | Coupling capacitor for the output signal to J2. | A1C41 | | | | 1 | 8 |

* Indicates a non-maintenance item.

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|---|---|
| COMMUNICATION ELECTRONICS INCORPORATED | DA-36-039-AMC-02918(E) |

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|---|---|---|---|---|---|---|---|---|
| A1C42 | CAPACITOR; same as A1C5 | Feedthru for BFO/FINE TUNING voltage to voltage variable diode CR1. | | | | | | 8 |
| A1C43 | CAPACITOR; same as A1C5 | AC bypass. | | | | | | 8 |
| A1C44 | CAPACITOR; same as A1C5 | AC bypass. | | | | | | 8 |
| A1C45 | CAPACITOR; same as A1C5 | Feedthru capacitor for L23 in filament circuit V3. | | | | | | 8 |
| A1C46 | NOT USED | | | | | | | |
| A1C47 | CAPACITOR; same as A1C11 | Used in conjunction with L24 to provide a series trap at the inputs. | | | | | | 8 |
| A1C48 | CAPACITOR; same as A1C5 | Feedthru capacitor for 6.3 VDC regulated to the filaments of V4 and provides AC bypassing. | | | | | | 8 |
| A1C49 | CAPACITOR, fixed, mica dielectric 82 pf, tolerance 5%, 500 wvdc; .363 in. lg. by .395 in. w by .183 in. thick, w/radial leads; Elmenco #DM10-820J. | Part of output pi-network. | A1C49 | | | | 1 | 8 |
| A1C50 | CAPACITOR; same as A1C3 | Screen grid bypass. | | | | | | 8 |
| A1CR1 | SEMICONDUCTOR, device, diode; High-Q varicap, 10 pf, 20%, 100 wvdc, 0.5 @ 75V max. inverse current; .125 in. dia. by .300 in. lg., axial leads 1.25 in. lg; Pacific Semiconductor, Inc. #PC-115. | Voltage variable capacitor diode which varies the oscillator frequency as a function of the voltage applied across its terminals. | A1CR1, A2CR2 | | | | 2 | 8 |

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|---|---|---|---|---|---|---|---|---|
| REF SYM OR PART NUMBER (1) | NAME OF PARTS OR DESCRIPTION (2) | FUNCTION (3) | ALL SYMBOLS AND PART NUMBERS INVOLVED (4) | JAN OR MIL TYPE NUMBER (5) | MAN-AGER (6) | FEDERAL STOCK NUMBER (7) | TOTAL NUMBER PARTS PER END ITEM (8) | REF FIGURE (9) |
| A1J1 | CONNECTOR, receptacle, electric; single-hole mount, type BNC, mounts in .375 in. D-hole, 1.046 in. lg., nom. voltages 500 volts peak, weatherproof; nominal impedance of 50 ohms, MIL UG-1094/U | Input jack from the antenna. | A1J1 | | CL | 5935-295-3346 | 1 | 8 |
| A1J2 | CONNECTOR, receptacle, electrical: screw-type connections, .593 in. lg. subminiature size, 50 ohm impedance, mounts in .190 in. hole by 10-32 nut; FXR Div. of Amphenol Borg #27-9 | Output jack from mixer stage, V3. | A1J2, A2J2 | | TX | 5935-518-9551 | 2 | 8 |
| A1L1* | COIL, radio frequency: Copper strip, Communication Electronics, Inc. | Trimmer coil in series with inductuner section L3A to provide series inductance at upper end of tuner frequency. | A1L1, A1L4 | | | | 2 | 8 |
| A1L2* | COIL, radio frequency: 17 turns of #27 wire, Communication Electronics, Inc. 1131-21 | Provides dc path to cathode of V1 and functions as a trimmer inductor. | A1L2, A1L5, A1L6, A1L9, A1L10, A1L11, A1L17, A1L19, A1L20, A1L21, A1L23 | | | | 11 | 8 |
| A1L3A,* B, C, D, E F | TUNER, radio frequency: six-section spiral inductuner: Communication Electronics, Inc. 2050 | A six section inductuner for tuning the frequency range of the tuner. | A1L3A, B, C, D, E, F | | | | 1 | 8 |
| A1L4* | COIL; same as A1L1 | RF choke in cathode circuit of V1. | | | | | | 8 |
| A1L5* | COIL; same as A1L2 | RF suppressor in filament circuit of V1. | | | | | | 8 |
| A1L6* | COIL; same as A1L2 | RF choke | | | | | | 8 |

* Indicates a non-maintenance item.

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| REF. SYM. OR PART NUMBER (1) | NAME OF PARTS OR DESCRIPTION (2) | FUNCTION (3) | ALL SYMBOLS AND PART NUMBERS INVOLVED (4) | JAN OR MIL TYPE NUMBER (5) | MAN-AGER (6) | FEDERAL STOCK NUMBER (7) | TOTAL NUMBER PARTS PER END ITEM (8) | REF FIGURE (9) |
|---|---|---|---|---|---|---|---|---|
| A1L7* | COIL, radio frequency: length of #20 buss wire, Communication Electronics, Inc. | Padder inductor for L3B and portion of dc path to plate of V1. | A1L7, A1L8, A1L12, A1L13 | | | | 4 | 8 |
| A1L8* | COIL; same as A1L7 | Padder inductor for L3C. Forms tuned circuit with C13 at high frequency end of tuner. | | | | | | 8 |
| A1L9* | COIL; same as A1L2 | Decoupling between cathode of V2 and power source. | | | | | | 8 |
| A1L10* | COIL; same as A1L2 | RF suppressor in filament circuit of V2. | | | | | | 8 |
| A1L11* | COIL; same as A1L2 | RF suppressor. | | | | | | 8 |
| A1L12* | COIL; same as A1L7 | Padder inductor for L3D and also functions as part of tuned circuit with C17 at high frequency end of tuner. | | | | | | 8 |
| A1L13* | COIL; same as A1L7 | Forms tuned circuit with C24 at high frequency end of tuner. | | | | | | 8 |
| A1L14* | COIL, radio frequency: 33 turns of #30 single nylon covered with magnet wire, Communication Electronics, Inc. 2171-11 | Tuning coil for output of V4. | A1L14 | | | | 1 | 8 |
| A1L15* | COIL, radio frequency: Communication Electronics, Inc. #1234 | Padder inductor for L3F thereby forming tuned circuit in oscillator section of V3. | A1L15 | | | | 1 | 8 |

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|---|---|---|---|---|---|---|---|---|
| A1L16* | COIL, radio frequency: 10 turns #27 single nylon magnet wire, Communication Electronics, Inc. #1131-20. | Padder inductor for L3F and also decoupling between plate of V4 and power supply. | A1L16 | | | | 1 | 8 |
| A1L17* | COIL; same as A1L2 | RF choke in cathode of V4. | | | | | | 8 |
| A1L18 | NOT USED | | | | | | | |
| A1L19* | COIL; same as A1L2 | RF suppressor in filament circuit of V3. | | | | | | 8 |
| A1L20* | COIL; same as A1L2 | RF suppressor in filament circuit of V4. | | | | | | 8 |
| A1L21* | COIL; same as A1L2 | Filament choke. | | | | | | 8 |
| A1L22 | NOT USED | | | | | | | |
| A1L23* | COIL; same as A1L2 | Filament choke. | | | | | | 8 |
| A1L24* | COIL, radio frequency: 6 turns of #18 single nylon magnet wire, Communication Electronics, Inc. #1129-04. | Forms a trap circuit in conjunction with C47 at the input to V1. | A1L24 | | | | 1 | 8 |
| A1R1 | RESISTOR, fixed, composition: 1K, 5%, 1/4W, per MIL-R-11 | Isolation between 6.3 VDC regulated and cathode of V1. | A1R1, A1R3, A1R11 | RC07GF102J | CL | 5905-681-6462 | 3 | 8 |
| A1R2 | RESISTOR, fixed, composition: 7.5K, 5%, 1W; per MIL-R-11. | Provides isolation between plate of V1 and power supply. | A1R2, A1R4 | RC32GF752J | CL | 5905-299-2034 | 2 | 8 |
| A1R3 | RESISTOR; same as A1R1 | Provides voltage drop in cathode of V2. | | | | | | 8 |
| A1R4 | RESISTOR; same as A1R2 | Provides voltage drop in plate of V2. | | | | | | 8 |
| A1R5 | RESISTOR, fixed, composition: 8.2K, 5%, 1/2W, per MIL-R-11 | Filter resistor for the B plus input to V4. | A1R5 | RC20GF822J | TX | 5905-299-1971 | 1 | 8 |

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|---|---|---|---|---|---|---|---|---|
| A1R6 | RESISTOR, fixed, composition: 100 ohm, 5%, 1/4W, per MIL-R-11 | Filter resistor for the B plus input to V4. | A1R6 | RC07GF101J | CL | 5905-683-7721 | 1 | 8 |
| A1R7 | RESISTOR, fixed, composition: 470K, 10%, 1/4W, per MIL-R-11 | Forms a voltage dividing network with R8 while providing isolation from the grid to read grid current. | A1R7, A1R8, A1R10 | RC07GF474K | CL | 5905-681-8957 | 3 | 8 |
| A1R8 | RESISTOR; same as A1R7 | Forms a voltage dividing network with R7; test point TP1 at junction of R7 and R8. | | | | | | 8 |
| A1R9 | RESISTOR, fixed, composition: 10K, 5%, 1W, per MIL-R-11 | Provides shunt feed path for dc voltage to plate of V4. | A1R9 | RC32GF103J | CL | 5905-279-1719 | 1 | 8 |
| A1R10 | RESISTOR; same as A1R7 | Forms a voltage dividing network with R11 in series with B plus source. | | | | | | 8 |
| A1R11 | RESISTOR; same as A1R1 | Voltage divider. | | | | | | 8 |
| A1R12 | RESISTOR, fixed, composition: 2.7K, 10%, 1/2W, per MIL-R-11 | Plate load resistor | A1R12 | RC20GF272K | CL | 5905-279-1880 | 1 | 8 |
| A1R13 | RESISTOR, fixed, composition: 33K, 5%, 1/4W, per MIL-R-11 | Voltage divider. | A1R13 | RC07GF333J | CL | 5905-686-3903 | 1 | 8 |
| A1R14 | RESISTOR, fixed, composition: 10K, 5%, 1/4W, per MIL-R-11 | Grid leak resistor. | A1R14 | RC07GF103J | CL | 5905-577-9465 | 1 | 8 |
| A1R15 | RESISTOR, fixed, composition: 1.5K, 10%, 1/4W, per MIL-R-11 | Voltage divider | A1R15 | RC07GF152K | CL | 5905-683-7723 | 1 | 8 |
| A1R16 | NOT USED | | | | | | | |
| A1R17 | NOT USED | | | | | | | |

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| A1TP1 | JACK, tip: .218 in. dia. by .437 in. lg. nylon press-fit jack w/brass body to accommodate .080 in. dia. tips; Taurus Corp. #TJ-6. | Monitoring and test facility. | A1TP1 | | | | 1 | 8 |
| A1V1 | ELECTRON, tube: .480 in. max. dia. by .438 in. lg. ceramic triode receiving tube; power gain 14.5 db, noise fig. 5.5 db, amplification factor 90, filament 6.3 volts, plate supply voltage 250 volts; General Electric Co. #7077 | RF Amplifier | A1V1, A1V2 | | CL | 5960-688-6706 | 2 | 7 |
| A1V2 | ELECTRON TUBE; same as A1V1 | RF Amplifier | | | | | | 7 |
| A1V3 | ELECTRON, tube: .435 in. dia. by 1.05 in. lg. ceramic insulated metal tube, sharp-cutoff tetrode, 6.3 volt heater, cap is JEDEC #C1-44, base is twelvar 5-pin (JEDEC #E5-65), plate supply voltage 125, grid no. 2 supply voltage 50, cathode resistor, 68 ohms; Radio Corp. of America # 7587 | Mixer | A1V3 | | CL | 5960-852-5545 | 1 | 7 |
| A1V4 | ELECTRON, tube: .480 in. max. dia. by .445 in. lg. metal-ceramic triode, 6.3 volt heater, 0.24 amp. heater current, plate voltage 250; General Electric Co. # 7486 | Local Oscillator | A1V4, A2V1 | | TX | 5960-883-0971 | 2 | 7 |
| A1XV1 | SOCKET, electron tube: UHF socket kit for GE #7077 tube; .625 in. w. by .860 in. lg. by 1.281 in. depth; low-loss compression molded matl., contacts beryllium copper mounted by two 2-56 screws; Jettron Products, Inc. #86-040. | Mounts V1. | A1XV1, A1XV2 | | TX | 5935-785-8823 | 2 | 7 |

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|---|---|---|---|---|---|---|---|---|
| A1XV2 | SOCKET; same as A1XV1 | Mounts V2. | | | | | | 7 |
| A1XV3 | SOCKET, electron tube: 5-contact socket for Nuvistor tubes, body of MFE low-loss matl., cad. plated steel saddle, cad. plated copper alloy contacts, mounted by crimping two tabs; .625 in. dia. by .5 in. high; Cinch Mfg. Co. #133-65-10-001. | Mounts V3. | A1XV3, A2XV2, A2XV3 | | CL | 5935-870-2513 | 3 | 7 |
| A1XV4 | SOCKET, electron tube: For GE #7077 tube; .468 in. by .875 in. by .812 in. ht., mounted by two 2-56 screws, contacts beryllium copper, insulator of low-loss compression molded matl.; Jettron Products, Inc. #86-000. | Mounts V4. | A1XV4, A2XV1 | | CU | 5960-084-8518 | 2 | 7 |
| | COVER, coil: aluminum rect. can 3/4 in. sq. by 1-1/4 in. h, .040 in. thick matl.; mounts w/2 springs on oppos. sides of can; CEI #1030-1 | Cover for L14 | | | | | 1 | |
| | COVER; cover for sym. A1 amplifier; 1/32 in. brass matl. 3.5 in. by 3.38; finish silver plate, w/ black characters on one side indicating schem. symbols; CEI #10228 | Bottom cover for tuner | | | | | 1 | |
| | COVER; cover for sym A1 amplifier; 1/32 in. brass matl. 3.5 in. by 5.34 in.; finish silver plate, w/black characters on one side indicating schem. symbols; CEI #10211. | Bottom cover for tuner | | | | | 1 | |

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| Figure 9 A2 | AMPLIFIER, RADIO FREQUENCY: Aluminum chassis, silver plated, gold flashed, 1.75 in. h by 4 in. w, by 5.5 in. d overall dimensions: 490 mc to 1000 mc input frequency range; 60 mc output frequency; 50 ohm input and output impedance: Communication Electronics, Inc. type 7123 | Tunes the 490-1000 mc range and converts received signals to 60 mc. | A2 | | | | 1 | 9 |
| A2C1A, B C, D, E* | TUNER, radio frequency: 5-sec. tuner shaft assembly, Communication Electronics, Inc. #2171 | Preselector variable tuning element. | A2C1A, B, C, D, E | | | | 1 | 9 |
| A2C2* | CAPACITOR, radio frequency: RF trimmer plate, Communication Electronics, Inc. #1261 | Trimmer for C1A. | A2C2, A2C3, A2C4, A2C5 | | | | 4 | 9 |
| A2C3* | CAPACITOR; same as A2C2 | Trimmer for C1B. | | | | | | 9 |
| A2C4* | CAPACITOR; same as A2C2 | Trimmer for C1C. | | | | | | 9 |
| A2C5* | CAPACITOR; same as A2C2 | Trimmer for C1D. | | | | | | 9 |
| A2C6* | CAPACITOR, radio frequency: Trimmer plate assembly, Communication Electronics, Inc. #1276 | Trimmer for C8. | A2C6 | | | | 1 | 9 |
| A2C7* | CAPACITOR, variable, ceramic, dielectric: range 0.5-3 pf, 500 wvdc; Erie Technological Products, Inc. #3115-001-1R. | Trimmer for C9. | A2C7 | | | | 1 | 9 |
| A2C8 | CAPACITOR, fixed, ceramic, dielectric: 1.0 pf, tolerance ±.1 pf, 500 wvdc; NPO temp. coefficient; .200 in. dia. by .400 in. lg., w/ radial leads 1.25 in. lg., uninsulated case; Erie Technological Products, Inc. #301-000-COKO-109B. | With C9, corrects oscillator tracking. | A2C8 | | | | 1 | 9 |

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|---|---|---|---|---|---|---|---|---|
| A2C9 | CAPACITOR, fixed, ceramic, dielectric: 1.5 pf, tolerance ±.25 pf, 500 wvdc; NPO temp. coefficient; .200 in. dia. by .400 in. lg., w/ radial leads 1.25 in. lg., uninsulated case; Erie Technological Products, Inc. #301-000-COKO-159C. | With C8, corrects oscillator tracking. | A2C9 | | TX | 5910-082-0042 | 1 | 9 |
| A2C10 | CAPACITOR, fixed, ceramic, dielectric: 0.27 pf, tolerance ±10% 500 wvdc; .109 in. dia. by .218 in. lg., w/axial leads; Quality Components, Inc. #MC | Coupling capacitor to fine tuning element. | A2C10 | | | | 1 | 9 |
| A2C11 | NOT USED | | | | | | | |
| A2C12 | CAPACITOR, fixed, ceramic, dielectric: 470 pf, 20% tolerance, 500 wvdc; double-ended feedthru, rivet mount, .281 in. dia. by .671 in. lg., Allen Bradley Co. #FA5C-4712. | Feedthru capacitor for fine tuning input voltage. | A2C12, A2C14, A2C18, A2C19, A2C30, A2C31 | | CU | 5910-956-8401 | 6 | 9 |
| A2C13 | CAPACITOR, fixed, ceramic dielectric: 137 pf, tolerance 20%, 500 wvdc; .125 in. by .500 by .500 w/single flat lead, solder-mounted General Instrument Corp., F.W. Sickles Div. #32-25394-1. | RF bypass for plate of V1. | A2C13 | | | | 1 | 9 |
| A2C14 | CAPACITOR; same as A2C12 | Feedthru capacitor for B plus through loading resistor R4. | | | | | | 9 |
| A2C15 | CAPACITOR, fixed, mica dielectric: 15 pf, tolerance 10%, 500 wvdc; .447 in. dia. by .632 in. lg.; mounts by 3 soldering ears; resin-sealed button style cap; Erie Technological Products, 370-CB-150K. | Feedthru capacitor for output of CR1 to V2. | A2C15 | | CU | 5910-850-4463 | 1 | 9 |

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| A2C16 | CAPACITOR, fixed, mica dielectric: 56 pf, tolerance 5%, 500 wvdc; .363 in. lg. by .395 in. w by .183 in. thick w/radial leads; 1.5 in. lg.; Arco Electronics, Inc. #DM10-560J. | Part of interstage coupling network. | A2C16 | | | | 1 | 9 |
| A2C17 | CAPACITOR, fixed, ceramic, dielectric: 1000 pf, tolerance GMV, 500 wvdc; single-ended standoff, rivet mount, .281 in. dia. by .437 in. lg.; Allen Bradley Co. #SS5A-102W. | RF bypass capacitor for V1 filament. | A2C17, A2C24, A2C32 | | CU | 5910-898-0216 | 3 | 9 |
| A2C18 | CAPACITOR; same as A2C12 | Feedthru capacitor for B plus input to plate of V1. | | | | | | 9 |
| A2C19 | CAPACITOR; same as A2C12 | Feedthru capacitor for B plus input to plate of V1. | | | | | | 9 |
| A2C20 | CAPACITOR, fixed, ceramic, dielectric: 1000 pf, tolerance 20%, 1000 wvdc; .300 in. dia. flat disc, .156 in. thick, w/two leads 1.5 in. lg., w/.250 in. spacing; Sprague Electric Co., #40C214A. | RF bypass in filament circuit of V2. | A2C20, A2C21, A2C22, A2C23, A2C27, A2C28 | | CU | 5910-686-7756 | 6 | 9 |
| A2C21 | CAPACITOR; same as A2C20 | DC blocking in grid of V2. | | | | | | 9 |
| A2C22 | CAPACITOR; same as A2C20 | RF bypass for cathode of V2. | | | | | | 9 |
| A2C23 | CAPACITOR; same as A2C20 | DC blocking capacitor in neutralization network. | | | | | | 9 |
| A2C24 | CAPACITOR; same as A2C17 | RF bypass for cathode of V3. | | | | | | 9 |

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|---|---|---|---|---|---|---|---|---|
| A2C25 | CAPACITOR, fixed, ceramic, dielectric: 1000 pf, tolerance, GMV, 500 wvdc; double-ended feedthru, rivet mount; .281 in. dia. by .681 in. lg.; Allen-Bradley Co. #FA5C-102W. | Feedthru capacitor for filament voltage to V2 and V3. | A2C25, A2C29 | | CL | 5910-802-7432 | 2 | 9 |
| A2C26 | CAPACITOR, fixed, ceramic, dielectric: 2.2 pf, tolerance ±.25 pf, 500 wvdc; .200 in. dia. by .400 in. lg., w/radial leads 1.25 in. lg., NPO temp. coefficient; non-insulated case; Erie Technological Products, Inc. #301-000-COJO-229C. | Part of output coupling network. | A2C26 | | CU | 5910-957-5121 | 1 | 9 |
| A2C27 | CAPACITOR; same as A2C20 | RF bypass for filament circuit of V3. | | | | | | 9 |
| A2C28 | CAPACITOR; same as A2C20 | DC blocking in output circuit. | | | | | | 9 |
| A2C29 | CAPACITOR; same as A2C25 | Feedthru capacitor for B plus to plate of V3. | | | | | | 9 |
| A2C30 | CAPACITOR; same as A2C12 | Feedthru capacitor for filament voltage to V1. | | | | | | 9 |
| A2C31 | CAPACITOR; same as A2C12 | Feedthru capacitor for filament voltage to V1. | | | | | | 9 |
| A2C32 | CAPACITOR; same as A2C17 | RF bypass. | | | | | | 9 |
| A2C33 | CAPACITOR, fixed, mica, dielectric: 100 pf, 5% tolerance, 500 wvdc; .370 in. w by .405 in. lg. by .197 in. thick, w/radial leads; Arco Electronics, Inc. #DM10-101J | Part of output coupling network. | A2C33 | | | | 1 | 9 |

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| A2CR1 | SEMICONDUCTOR, device, diode: .180 in. dia. by .625 in. lg. silicon point contact diode, hermetically sealed, w/axial leads, .5 in. lg.; Overall noise factor 14 db, fwd. current 10-20 ma, reverse current 100 $\mu$a max, operating freq. 0 to 1000 mc, peak reverse voltage -5V; Motorola Semiconductor Products, Inc. # 1N82A. | Crystal mixer. | A2CR1 | | CL | 5960-752-0243 | 1 | 9 |
| A2CR2 | SEMICONDUCTOR; same as A1CR1 | Fine tuning element. | | | | | | 9 |
| A2J1 | CONNECTOR, receptacle, electrical; Rt. angle receptacle, square flange mt. .75 in. by .75 in. w/4 ea .136 in. dia. mtg. holes; .906 in. high; BNC type connection, 50 ohm impedance; Amphenol-Borg #UG-535/U. | Input jack. | A2J1 | | CL | 5935-295-3345 | 1 | 9 |
| A2J2 | CONNECTOR; same as A1J2 | Output jack. | | | | | | 9 |
| A2J3 | NOT USED | | | | | | | |
| A2J4 | JACK, telephone; Ultra-miniaturized, 2 cond., closed circuit, nylon insulation, nickel silver springs, mts. in .190 in. hole w/10-48 nut, accommodates .1 dia. tips, .531 in lg. by .250 in. dia.; Switchcraft, Inc. #TR-2A. | Phone jack. | A2J4 | | CU | 5935-045-9075 | 1 | 9 |
| A2L1* | COIL, radio frequency: .94 in. lg. # 16 buss wire, Communication Electronics, Inc. #1461 | Input coupling coil. | A2L1 | | | | 1 | 9 |
| A2L2* | COIL, radio frequency: modified RF stator, Communication Electronics, Inc. #1265 | Part of RF tuning circuit. | A2L2, A2L3, A2L4, A2L5 | | | | 4 | 9 |

* Indicates a non-maintenance item.

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| A2L3* | COIL; same as A2L2 | Part of RF tuning circuit. | | | | | | 9 |
| A2L4* | COIL; same as A2L2 | Part of RF tuning circuit. | | | | | | 9 |
| A2L5* | COIL; same as A2L2 | Part of RF tuning circuit. | | | | | | 9 |
| A2L6* | COIL, radio frequency: 1.46 in. lg, #20 buss wire, Communication Electronics, Inc. #1462 | Couples oscillator signal to mixer. | A2L6 | | | | 1 | 9 |
| A2L7* | COIL, radio frequency: stator assembly, Communication Electronics, Inc. #1301. | Part of oscillator tank circuit. | A2L7 | | | | 1 | 9 |
| A2L8* | COIL, radio frequency: tinned strap, Communication Electronics, Inc. | Tunes the plate circuit of V1. | A2L8 | | | | 1 | 9 |
| A2L9* | COIL, radio frequency: 10 turns #26 magnet wire, Communication Electronics, Inc. #1466-4 | RF choke for cathode of V1. | A2L9 | | | | 1 | 9 |
| A2L10* | COIL, radio frequency: 14 turns #26 magnet wire, Communication Electronics, Inc. #1466-3 | RF suppressor in filament circuit of V1. | A2L10, A2L11 | | | | 2 | 9 |
| A2L11* | COIL; same as A2L10 | V1 filament choke | | | | | | 9 |
| A2L12 | NOT USED | | | | | | | |
| A2L13* | COIL, radio frequency: 4 turns #26 magnet wire, Communication Electronics, Inc. #1466-1 | Part of interstage coupling network. | A2L13 | | | | 1 | 9 |
| A2L14* | COIL, radio frequency: 5 turns #26 magnet wire, Communication Electronics, Inc. #1466-2 | RF choke in test jack circuit. | A2L14 | | | | 1 | 9 |

* Indicates a non-maintenance item.

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|---|---|---|---|---|---|---|---|---|
| A2L15* | COIL, radio frequency: 14-1/2 turns #26 magnet wire on coil form, Communication Electronics, Inc. #1471-2 | Part of interstage coupling network | A2L15 | | | | 1 | 9 |
| A2L16* | COIL, radio frequency: 33 turns #40 magnet wire on coil form, Communication Electronics, Inc. #1472-12 | Neutralizing coil | A2L16 | | | | 1 | 9 |
| A2L17* | COIL, radio frequency: 13 turns #30 magnet wire on coil form, Communication Electronics, Inc. #1472-13 | Part of output coupling network. | A2L17 | | | | 1 | 9 |
| A2R1 | NOT USED | | | | | | | |
| A2R2 | RESISTOR, fixed, composition: 5.6K, 5%, 1/4W, per MIL-R-11 | Load resistor for tracking capacitors C6, C7, C8 and C9. | A2R2 | RC07GF562J | CL | 5905-691-0195 | 1 | 9 |
| A2R3 | RESISTOR, fixed, composition: 33K, 10%, 1/4W, per MIL-R-11 | Dropping resistor for fine tuning input. | A2R3 | RC07GF333K | | | 1 | 9 |
| A2R4 | RESISTOR, fixed, composition: 100 Ω, 10%, 1/4W, per MIL-R-11 | Loading resistor across L8. | A2R4 | RC07GF101K | CL | 5905-683-7721 | 1 | 9 |
| A2R5 | RESISTOR, fixed, composition: 1K, 10%, 1/4W, per MIL-R-11 | Voltage dropping in plate of V1. | A2R5, A2R10 | RC07GF102K | CL | 5905-681-6462 | 2 | 9 |
| A2R6 | RESISTOR, fixed, composition: 47K, 5%, 1/4W, per MIL-R-11 | Isolates TP1 | A2R6, A2R8 | RC07GF473J | CL | 5905-683-2246 | 2 | 9 |
| A2R7 | RESISTOR, fixed, composition: 68 Ω, 5%, 1/4W, per MIL-R-11 | Cathode biasing resistor. | A2R7 | RC07GF680J | CL | 5905-683-2235 | 1 | 9 |
| A2R8 | RESISTOR; same as A2R6 | Grid leak resistor for V3. | | | | | | 9 |
| A2R9 | RESISTOR, fixed, composition: 10 Ω, 10%, 1/4W, per MIL-R-11 | Parasitic suppressor. | A2R9 | RC07GF1001 | CL | 5905-817-7971 | 1 | 9 |

* Indicates a non-maintenance item.

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|---|---|---|---|---|---|---|---|---|
| A2R10 | RESISTOR; same as A2R5 | Isolation resistor in series with B plus input to V3. | | | | | | 9 |
| A2R11 | RESISTOR, fixed, composition: 12K, 5%, 1/2W, per MIL-R-11 | Isolation resistor in series with B plus input to V1. | A2R11 | | CL | 5905-279-3502 | 1 | 9 |
| A2V1 | ELECTRON TUBE; same as A1V4 | Local Oscillator | | | | | 1 | 6 |
| A2V2 | ELECTRON, tube: High-mu Nuvistor triode, all metal-ceramic construction, .435 in. dia. by .8 in lg., w/twelvar 5-pin base; 6.3 volt heater, plate supply voltage 110, grid supply voltage-0, cathode resistor 130 ohms, plate current 7.6 ma; Radio Corp. of America #6CW4 | 60 mc IF Amplifier | A2V2, A2V3 | | CL | 5960-235-8215 | 2 | 9 |
| A2V3 | ELECTRON TUBE; same as A2V2 | 60 mc IF Amplifier | | | | | | 9 |
| A2XV1 | SOCKET; same as A1XV4 | Mounts V1 | | | | | | 9 |
| A2XV2 | SOCKET; same as A1XV3 | Mounts V2 | | | | | | 9 |
| A2XV3 | SOCKET; same as A1XV3 | Mounts V3 | | | | | | 9 |
| | COVER; for A2 tuner; .032 in. cold rolled steel, copper-flashed, silver plated, w/black characters indicating schematic symbols; size 4.16 in. by 4.53 in.; Communication Electronics, Inc. #2446. | Top cover for tuner | | | | | 1 | 9 |

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|---|---|---|---|---|---|---|---|---|
| Figure 10 A3 | POWER SUPPLY SUBASSEMBLY: w/7 Semiconductor devices, diode; 2.5 in. lg. by 2 in. w. by 5/16 in. h.; plugs in strip Varicon connector Communication Electronics, Inc. #7611 | Power supply providing the necessary operating voltages for the CV-1750/U Converter. | A3 | | | | 1 | 6 |
| A3CR1 | SEMICONDUCTOR, device, diode: Diffused junction silicon rectifiers, hermetically sealed metal cases, .240 in. dia. by .405 in. lg. w/ plastic sleeve insulation; peak reverse voltage 200, forward current 750 (resistive load), 500 (capacitor filter); Radio Corp. of America #1N3253. | Rectifier | A3CR1, A3CR2 A3CR3, A3CR4 | | CU | 5960-964-5478 | 4 | 10 |
| A3CR2 | SEMICONDUCTOR; same as A3CR1 | Rectifier | | | | | | 10 |
| A3CR3 | SEMICONDUCTOR; same as A3CR1 | Rectifier | | | | | | 10 |
| A3CR4 | SEMICONDUCTOR; same as A3CR1 | Rectifier | | | | | | 10 |
| A3CR5 | SEMICONDUCTOR, device, diode: Diffused junction silicon rectifiers, hermetically sealed metal cases, .240 in. dia. by .405 in. lg. w/ plastic sleeve insulation; peak reverse voltage 420 (resistive) and 210 (capacitive); fwd. current 750 (resistive) and 500 (capacitive); Radio Corp. of America #1N3255. | Rectifier | A3CR5, A3CR6 | | CU | 5960-068-6953 | 2 | 10 |
| A3CR6 | SEMICONDUCTOR; same as A3CR5 | Rectifier | | | | | | 10 |
| A3CR7 | SEMICONDUCTOR, device, diode: Zener diode (regulator); hermetically sealed cases; .125 in. dia. by .300 in. lg. axial terminals (2), 1.25 in. lg.; nom. zener volt, 6.2 reverse test voltage 4 vdc; Pacific Semiconductors #1N753A. | Regulator | A3CR7 | | | | 1 | 10 |

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| A3R1 | RESISTOR, fixed, composition: 430 Ω, 5%, 1/2W, per MIL-R-11 | Current limiting resistor. | A3R1 | RC20GF431J | CL | 5905-279-3512 | 1 | 10 |
| A3R2 | RESISTOR, fixed, composition: 100K, 5%, 1/4W, per MIL-R-11 | Dropping resistor | A3R2 | RC20GF104J | CL | 5905-577-9674 | 1 | 10 |
| | PRINTED CIRCUIT BOARD, 1/16 in. thick epoxy resin glass base, grade G-10, w/1 oz. copper on 1 side; 2.60 in. by 2.0 in; finish tin plated; Communication Electronics, Inc. #10195 | Mounts power supply components. | | | | | 1 | 10 |

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| C1 | CAPACITOR, fixed, electrolytic: Aluminum foil, 500 μf, 25 wvdc; 1 in. dia. by 2 in. high w/twist-lock mtg. tabs on bottom, metal can, uninsulated, vertical mt. General Electric Co. #43F8123BA2 | Filter on -6.3V supply | C1 | | | | 1 | 6 |
| C2A,B | CAPACITOR, fixed, electrolytic: aluminum foil, dual 15 μf, 350 wvdc, 1 in. dia. by 2 in. high, w/twist lock mtg. tabs on bottom, metal can, uninsulated, vertical mt General Electric Co. #43F2299BB1 | B plus filters | C2A,B | | | | 1 | 6 |
| CP1 | ADAPTER, connector: Adapter between series subminature to BNC; fits into UG-88/U plug (BNC); .25 in. dia. by 1.312 in. lg.; 50 Ω RF connector; FXR Division of Amphenol-Borg #27-28. | Connects P6 to P11 | CP1, CP2 | | | | 2 | 6 |
| CP2 | ADAPTER; same as CP1 | Connects P8 to P12. | | | | | | 6 |
| CR1 | NOT USED | | | | | | | |
| CR2 | NOT USED | | | | | | | |
| CR3 | NOT USED | | | | | | | |
| CR4 | NOT USED | | | | | | | |
| CR5 | NOT USED | | | | | | | |
| CR6 | NOT USED | | | | | | | |
| CR7 | NOT USED | | | | | | | |

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|---|---|---|---|---|---|---|---|---|
| CR8 | SEMICONDUCTOR, device, diode: 10 watt zener diode, silicon diffused-junction; .437 in. dia. by 1.275 in. lg.; zener voltage nominal 150, zener voltage min. 142.5, zener voltage max. 157.5 max. DC current 62, voltage regulation 7.0; Texas Instrument #1N3011B. | Voltage regulator. | CR8 | | BD | 5960-892-0913 | 1 | 7 |
| DS1 | LAMP, incandescent; 6.3 volt, .15 amp., 3000 hr. life; #T-3-1/4 bulb, min. bayonet base, .406 in. dia. by 1.187 in. lg.; General Electric Distributing Corp. #47 | Dial light | DS1, DS2 | | AK | 6240-155-8706 | 2 | 7 |
| DS2 | LAMP; same as DS1 | Dial light | | | | | | 7 |
| DS3 | LAMP, incandescent; 6 volt, .04 amps., 1000 hr. life; #T-1-3/4 bulb, single contact midget flange base, .056 in. dia. by .625 lg.; General Electric Distributing Corp. #345 | Pilot light | DS3 | | CU | 6240-683-0560 | 1 | 7 |
| F1 | FUSE, cartridge: Slow-blow, 0.3 amp, 250V, 3AG size glass fuse, .25 in. dia. by 1.25 in. lg.; Bussman Mfg. Co. #MDL-3/10 | Line fuse on 115 volt operation. | F1 | | CL | 5920-235-8362 | 1 | 4 |
| F2 | FUSE, cartridge: Slow-blow, 0.15 amp, 250V, 3AG size glass fuse, .25 in. dia. by 1.25 in. lg.; Bussman Mfg. Co. #MDL-15/100. | Line fuse on 230 volt operation. | F2 | | CL | 5920-503-0454 | 1 | 4 |
| J1 | NOT USED | | | | | | | |

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|---|---|---|---|---|---|---|---|---|
| J2 | CONNECTOR, receptacle, electrical: Series N, screw connection, panel jacks, square flange; for cable size RG-55/U and RG-58/U; 1 in. sq. chassis mtg; flange w/4ea 1/8 in. dia. mtg. holes, 1.812 in. lg.; brass body silver plated; 50 ohm impedance, Rexolite insulation Amphenol-Borg #UG-1052/U | RF input jack | J2,J3,J4 | | | | 3 | 4 |
| J3 | CONNECTOR; same as J2 | RF input jack | | | | | | 4 |
| J4 | CONNECTOR; same as J2 | RF input jack | | | | | | 4 |
| J5 | CONNECTOR; part of K1 | Connector to K1 | | | | | | 4 |
| J6 | CONNECTOR; part of K2 | Connector to K2 | | | | | | 6 |
| J7 | CONNECTOR; part of K2 | Connector to K2 | | | | | | 6 |
| J8 | CONNECTOR; part of K2 | Connector to K2 | | | | | | 6 |
| J9 | CONNECTOR; part of K1 | Connector to K1 | | | | | | 6 |
| J10 | CONNECTOR; part of K1 | Connector to K1 | | | | | | 6 |
| K1 | SWITCH, radio frequency transmission line: Coil volts 26-DC, coil resistance 280 ohms, SPDT remote operation function, three BNC connectors, 2 on 1 side and 1 on opposite side, 2750 mc freq., 100-w power; 2 in. by 1.562 in.; FXR Division of Amphenol-Borg #317-010202-3. | Switches input and output connections. | K1 | | | | 1 | 6 |

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|---|---|---|---|---|---|---|---|---|
| K2 | SWITCH, radio frequency transmission line: Coil volts 26-DC coil resistance 280 ohms, SPDT remote operation function, three BNC connectors, on same side, 2750 mc freq. 100-w power; 2 in. by 1.562 in.; FXR Division of Amphenol-Borg #318-010382-3. | Switches input and output connections. | K2 | | | | 1 | 6 |
| P1 | CONNECTOR; part of W2 | Connects A1J1 to W2 | | | | | | 7 |
| P2 | CONNECTOR; part of W1 | Connects A2J1 to W1 | | | | | | 6 |
| P3 | CONNECTOR; part of W3 | Connects J8 to W3 | | | | | | 6 |
| P4 | CONNECTOR; part of W4 | Connects J7 to W4 | | | | | | 6 |
| P5 | CONNECTOR; part of W4 | Connects J9 to W4 | | | | | | 6 |
| P6 | CONNECTOR; part of W5 | Connects CP1 to W5 | | | | | | 6 |
| P7 | CONNECTOR; part of W5 | Connects A1J2 to W5 | | | | | | 6 |
| P8 | CONNECTOR; part of W6 | Connects CP2 to W6 | | | | | | 6 |
| P9 | CONNECTOR; part of W6 | Connects A2J2 to W6 | | | | | | 6 |
| P10 | CORD ASSEMBLY, electrical: 6.5 ft. #18-3-conductor, type SV black, rubber-covered cable, w/ molded rubber connector on end .265 in. cable dia. tinned copper conductors, Cornish Wire Co. #01753-001. | Power plug | P10 | | | | 1 | 6 |
| P11 | CONNECTOR, plug, electrical: Straight cable plug, type BNC, for .212 in. max. cable size; .562 in. dia. by .875 in. lg.; brass body silver plated; teflon insulation; Amphenol-Borg #UG-88/U. | Connects CP1 to J6. | P11,P12 | | CU | 5935-149-4066 | 2 | 6 |

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|---|---|---|---|---|---|---|---|---|
| P12 | CONNECTOR; same as P11 | Connects CP2 to J10 | | | | | | 6 |
| Q1 | TRANSISTOR: 5-amp. power type, germanium PNP, collector-emitter 40 VDC, emitter-base 20 VDC, collector current (continuous) 5 amp., collector current (peak) 10 amps; JEDEC size TO-3, 1.53 in. lg. by 1 in. w by .41 in. high, w/ two mtg. holes each end .156 in. dia.; Motorola Semiconductors #2N1544. | Series regulator | Q1 | | CL | 5960-833-6322 | 1 | 6 |
| R1 | NOT USED | | | | | | | |
| R2 | RESISTOR, fixed, composition: 1K, 5%, 2W, per MIL-R-11 | Filter resistor. | R2 | RC42GF102J | CL | 5905-256-3361 | 1 | 7 |
| R3 | RESISTOR, fixed, composition: 2K, 5%, 2W, per MIL-R-11 | Dropping resistor for CR8. | R3 | RC42GF202J | CL | 5905-256-8355 | 1 | 7 |
| R4 | NOT USED | | | | | | | |
| R5 | NOT USED | | | | | | | |
| R6 | RESISTOR, variable, composition: 100K, 10% tolerance, 2-watt, composition element potentiometer, 3 leads; 1 in. dia, .812 in. o/A shaft lg., 1/4 in. dia. 3/8-32 bushing .375 in. lg., linear taper; all metal parts stainless steel; Allen Bradley Co. #JA1N052P104UA | Fine tuning control | R6 | | CL | 5905-644-6693 | 1 | 5 |
| R7 | RESISTOR, fixed, composition: 5.1K, 5%, 1/4W, per MIL-R-11 | Limiting resistor in series with R6. | R7 | RC07GF512J | CL | 5905-683-2241 | 1 | 7 |

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|---|---|---|---|---|---|---|---|---|
| S1 | SWITCH, toggle: single pole, double-throw; 3-amp, at 125V; .687 in. w/ by 1.156 in. lg., by .968 in. ht. of body; .468 in. lg. nickel plated bat handle, back-connected terminal lugs; quick make and break; Cutler-Hammer, Inc. #8282-K14. | Power switch | S1 | | CL | 5930-112-5105 | 1 | 6 |
| S2 | SWITCH, slide: double-pole, double-throw; A/C current, 125 volts, .75 amp; 1.406 in. lg, by .553 in. w by .632 in. high; slide-button, .307 in. lg. by .217 in. wide; solder-lug terminal types; Continental-Wirt #G326. | 115V-230V switch | S2 | | | | 1 | 6 |
| S3A, B, C, D | SWITCH, rotary: 2 sections, 2 poles per section w/6 aprons each section; non-shorting contacts; silicone glass insulation ea. section; 1 in. height, 63/64 in. lg. from mtg-surface, 15/16 in. wide; 3/8-32 thread mtg. bushing; 1/4 in. dia. shaft 2-3/8 in. lg, from mtg. surface; Oak Mfg. Co. #399225A. | Function switch | S3A, B, C, D | | | | 1 | 6 |
| T1 | TRANSFORMER, power, isolation and step-down and step-up; hermetically sealed metal case, 2.12 in. h, 3 in. lg, 2.56 in. w; stand-off solder termination type; mounts on 4 8-32 studs; primary windings 115V, 50-400 cps, 1 phase; Communication Electronics #1523. | Power supply transformer. | T1 | | | | 1 | 6 |

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|---|---|---|---|---|---|---|---|---|
| W1 | CABLE ASSEMBLY, radio frequency: 53.5 ohms impedance, solid copper conductor, #20 AWG (.032 in.) cable type RG-55/U, 14 in. lg, o/A w/1 ea. UG-88/U and UG-1052/U on opposite ends; Communication Electronics, Inc. #2126-83. | Connects input to high-band tuner. | W1 | | | | 1 | 6 |
| W2 | CABLE ASSEMBLY, radio frequency: 53.5 ohms impedance, solid copper conductor, #20 AWG (.032 in); cable type RG-55/U, 9.5 in. lg. o/A w/1 ea. UG-88/U and UG-1052/U on opposite ends; Communication Electronics, Inc. #2126-73. | Connects input to low band tuner. | W2, W3 | | | | 2 | 6 |
| W3 | CABLE ASSEMBLY; same as W2 | Connects direct input to K2. | | | | | | 6 |
| W4 | CABLE ASSEMBLY, radio frequency: 53.5 ohms impedance, solid copper conductor, #20 AWG (.032 in); cable type RG-55/U 8.5 in. lg. o/A w/1 ea. UG-88/U plug on both ends; Communication Electronics, Inc. #2126-45 | Connects K2 to K1 | W4 | | | | 1 | 6 |
| W5 | CABLE ASSEMBLY, radio frequency: 50 ohms impedance, stranded conductor, 7 strands of #34 AWG copper covered steel; cable type RG-174/U, 7-3/4 in. lg. o/A w/1 #27-7 plug on both ends; Communication Electronics, Inc. #2126-33. | Connects low band tuner to K2. | W5 | | | | 1 | 6 |

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|---|---|---|---|---|---|---|---|---|
| W6 | CABLE ASSEMBLY, radio frequency: 50 ohms impedance, stranded conductor, 7 strands of #34 AWG copper covered steel; cable type RG-174/U, 16 in. lg, o/A w/1 ea. #27-7 plug on both ends; Communication Electronics, Inc. #2126-31. | Connects high band tuner to K1. | W6 | | | | 1 | 6 |
| XA3 | CONNECTOR, receptacle, electrical: 11 contact strip connector; low-loss plastic dielectric; polarized, non-locking, 2.618 in. lg. by 1/2 in. w; Elco Corp. #5002-11-A2-1-B. | Mounts A3 | XA3 | | | | 1 | |
| XDS1 | LAMPHOLDER; for one min. bayonet base socket in brass shell, 1-1/16 in. lg, by 1/2 in. w by 3/4 in. high; clip-mounted; Dialight Corp. #7-02. | Lampholder for DS1 | XDS1, XDS2 | | | | 2 | |
| XDS2 | LAMPHOLDER; same as XDS1 | Lampholder for DS2 | | | | | | |
| XDS3 | LIGHT, indicator: sub-min. h, for T-1-3/4 incandescent lamps, takes #345 lamp; lens red, translucent, stovepipe shape; mts. in 15/32 in. hole; 3/8 -24 thd.; projects 49/64" in rear of panel; solder terminal; Dialight Corp. #107-1930-971. | Lampholder for DS3 | XDS3 | | CU | 6210-811-8504 | 1 | |
| XF1 | FUSEHOLDER: for fuses 1/4 in. dia. (3AG type), mounts w/neoprene washer and steel mtg. nut; carries 30 amps; Bussman mfg. Div. #HKP. | Fuseholder for F1 | XF1,XF2 | | CL | 5920-285-0752 | 2 | |

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| XQ1 | SOCKET, semiconductor device; molded plastic construction, for transistor; .312 in. h, 1.000 in. w., 1.578 in. l; copper base alloy contacts, tin-plated; Augat Electronic Components and Hardware, Inc. #8038-1G1. | Mounts Q1 | XQ1 | | | | 1 | |
| | COUPLING, shaft, flexible; corrosion-resisting steel; 1/4" id by 1/2" od by 1 in. lg.; Flexonics Division of Calumet and Heda, Inc. #FC-9. | Connects tuner shaft to gear train. | | | | | 1 | |
| | GEAR CLUSTER, spur: Anti-backlash gear arrangement, w/1 gear pinned to hub and a second gear not pinned; 72 pitch, 114 teeth, 1.6111 od.; Communication Electronics, Inc. #1722-1. | Prevents backlash | | | | | 1 | |
| | GEAR ASSEMBLY, speed decreaser an arrangement of dials, friction disc assem., clutch plates, compression springs, and gear box to reduce the speed of a drive shaft; 3.16 by 3.66 by 4 in., Communication Electronics, Inc. #2205. | Transmits motion from tuning point to tuner. | | | | | 1 | |
| | BEARING, sleeve: 7/16 in. dia. by .250 in. lg., w/.188 in. through hole, matl. 1/2 hard brass; tapped in 2 places at 90 degree angle w/ 4-40 tap; Communication Electronic Inc. #1645 | Friction disc spacer | | | | | 2 | |

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|---|---|---|---|---|---|---|---|---|
| | CLUTCH, half, friction; 7/16in. dia. stainless steel type 303, w/.188 in center hole and rounded off dome-shaped top; passivated finish; Communication Electronics, Inc. #1644. | Turns against friction disc. | | | | | 1 | |
| | CLUTCH, half, friction: 7/16 in. dia. stainless steel type 303; .188 in. dia. center hole, w/2 4-40 tapped holes 90 degrees apart, 5/16 in. lg.; passivated finish; Communication Electronics, Inc. #1643. | Turns against friction disc. | | | | | 1 | |
| | DISK, clutch: Stainless steel plate type 303, passivated finish, 1/16 in. thick by 1.47 in. dia., w/1/2 in. dia. brass hub staked on: Communication Electronics, Inc. #1642. | Drives pinion shaft. | | | | | 1 | |
| | DIAL, control; 1/8 in. thick milky white plastic by 3.12 in. dia.; calibrations along outer edge in black numbered 235 through 500, w/ center hole .469 in. dia.; Communication Electronics, Inc. #1735-1 | Indicates operating frequency. | | | | | 1 | |
| | GEAR, spur: 108 teeth, aluminum, 1.5277 od, 1.500 pitch dia. 20 degrees pressure angle, w/phosphor bronze hub 1.12 in. dia. od, Communication Electronics, Inc. #1733 | Drives tuning dial. | | | | | 1 | |

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| | GEAR, spur: .250 in. dia. stainless steel shaft with double pinion gear 14 teeth, 20 degrees pressure angle, 72 pitch, o/A lg. 1.88 in. passivated finish; Communication Electronics, Inc. #1716 | Drives anti-backlash gear. | | | | | 1 | |
| | GEAR ASSEMBLY, speed decreaser an arrangement of dials, friction disk assem., clutch plates, compression springs, and gear box, to reduce the speed of a drive shaft 3.16 in. by 3.66 in. by 4 in., Communication Electronics, Inc. #2204. | Transmits motion from tuning point to tuner. | | | | | 1 | |
| | RING, retaining: for 1/4 in. shaft .025 in. thick stainless steel; .450 in. od, external classification; Industrial Retaining Ring Co. #3100-25-SS. | Keeps driver shaft in place. | | | | | 2 | |
| | SPACER, sleeve: Brass, half-hard 1/2 in. dia. by .250 in. id by .22 in. lg., with 4-40 tapped holes at 90 degree angle: Communication Electronics, Inc. #1685. | Friction disc spacer. | | | | | 2 | |
| | SPRING, helical, compression: .026 in. dia. cold rolled steel wire, cad. plated wound 1/4 in. lg. by 1/8 in. dia. coil; Wallace Barnes Div.of Associated Spring Corp. #C-360-026-0500. | Keeps tension on clutch. | | | | | 2 | |

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| | SHAFT, shouldered: Stainless steel, type 303, .250 in. dia. by 3.03 in. o/A lg. of which .114 in. is .1874 in. dia; Communication Electronics, Inc. #1646-1 | Turns anti-backlash gear. | | | | | 2 | |
| | GEAR ASSEMBLY, speed decreaser: an arrangement of dials, friction disk assemblies, clutch plates, compression springs and gear box, to reduce the speed of a drive shaft; 3.16 in. by 4.31 in. by 6 in; Communication Electronics, Inc. #3443 | Transmits motion from tuning point to tuner. | | | | | 1 | |
| | BEARING, sleeve: 7/16 in. dia. by .250 in. lg., w/.188 in. through hole, matl. 1/2 hard brass; tapped in 2 places at 90 degree angle w/ 4-40 tap; Communication Electronics Inc. #1645. | Friction disc spacer | | | | | 1 | |
| | CLUTCH, half, friction: 5/8 in. dia stainless steel type 303; passivated finish; .187 in. id, domed top; Communication Electronics, Inc. #1751 | Drives friction disc | | | | | 1 | |
| | CLUTCH, half, friction: 5/8 in.dia stainless steel, passivated finish; .187 in. id, w/2 4-40 tapped holes 90 degrees apart; domed top; Communication Electronics, Inc. #1750 | Drives friction disc | | | | | 1 | |
| | CLUTCH, friction: .040 in. stainless steel sheet, passivated; 2.94 in. dia. with brass hub, 1/2 in. dia. by .312 in. lg, .250 in. id; Communication Electronics, Inc. #1753 | Drives shouldered shaft. | | | | | 1 | |

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| | DIAL, control: 1/8" thick milky white plastic, 3.12 in. dia. w/ black markings 490 through 1000; w/.469 in. dia. center hole; Communication Electronics, Inc. #1742 | Indicates operating frequency. | | | | | 1 | |
| | GEAR, spur: aluminum, 207 teeth 20 degrees pressure angle; 2.9027 in. od, 72 pitch; with phosphor bronze hub 1.12 in. dia. by .86 in. lg., .250 in. id; Communication Electronics, Inc. #1749 | Drives tuning dial | | | | | 1 | |
| | GEAR, spur: type 303 stainless steel pin hub type, 72 pitch, 3/16 in. bore, 1/8 in. face, 20 degrees pressure angle, 29 teeth; .4305 od, by .312 in. lg.; Communication Electronics, Inc. #1763-1. | Drives tuning dial | | | | | 1 | |
| | GEAR, spur: .250 in. dia. stainless steel pinion shaft, 20 degree pressure angle, 14 teeth, 72 pitch, 2.03 in. o/A lg., dia. .187 in. on end opposite from gear; Communication Electronics, Inc. #1747 | Drives anti-backlash gear | | | | | 1 | |
| | GEAR, cluster, spur: anti-backlash gear, 2.5974 in. od, 185 teeth 72 pitch, aluminum; stainless steel hub, 9/16 in. dia; .250 in. hole; Communication Electronics, Inc. #1761-1. | Prevents backlash | | | | | 1 | |

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|---|---|---|---|---|---|---|---|---|
| | GEAR ASSEMBLY, speed decreaser: an arrangement of dials, friction disk assemblies, clutch plates compression springs and gear box to reduce the speed of a drive shaft 3.16 in. by 4.31 in. by 6 in.; Communication Electronics, Inc. #2419-1. | Transmits motion from tuning point to tuner. | | | | | 1 | |
| | RING, retaining: for 1/4 in. shaft .025 in. thick stainless steel; .450 in. od.; external classification; Industrial Retaining Ring Co. #3100-25-SS. | Keeps drive shaft in place | | | | | | |
| | SPACER, sleeve: Brass, half-hard, 1/2 in. dia. by .250 in. id. by .22 in. lg., with two 4-40 tapped holes at 90 degree angle; Communication Electronics, Inc. #1685. | Friction disc spacer | | | | | | |
| | SPRING, helical, compression: .026 in. dia. cold rolled steel wire cad. plated wound 1/4 in. lg. by 1/8 in. dia. coil; Wallace Barnes Div. of Associated Spring Corp. #360-026-0500. | Keeps tension on clutch | | | | | | |
| | SHAFT, shouldered: Stainless steel, type 303, .250 in. dia. by 3.03 in. o/A lg. of which .114 in. is .1874 in. dia.; Communication Electronics, Inc. #1646-1. | Turns anti-backlash gear. | | | | | | |

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| | SHAFT, shouldered: .250 in. dia. stainless steel coupling shaft 1.70 in. lg. o/A; w/90 degree pin in one end .25 in. high; passivated finish; Communication Electronics, Inc. #1760. | Stops rotation at end of tuning range. | | | | | 1 | |
| | GROMMET, rubber: black rubber round grommet for 47/64 in. chassis hole, cable size 19/32 in., 15/16 in. od, 7/64 in. thickness; Atlantic India Rubber Works #1177 | Protects insulation on wires. | | | | | 1 | |
| | HANDLE, bow: 5/16 in. dia. brass rod, bow shaped, tapped 8-32 ea. end; 2 in. lg., 1.312 in. high; nickel plated; Cambridge Thermionic Corp. #1250-1. | Handles on rear apron. | | | | | 2 | |
| | HANDLE, bow: 5/16 in. dia. brass rod, bow shaped; tapped 8-32 ea. end; 3 in. lg., 1.312 in. high; nickel plated; Cambridge Thermionic Corp. #1252-1 | Handle on front panel | | | | | 2 | |
| | KNOB: molded phenolic, 1-17/64 in. dia. by 1- 5/16 in. high w/ alum. bushing for 1/4 in. dia. shaft color gray; Communication Electronics, Inc. #1028 | Tuning knob | | | | | 2 | |
| | KNOB: molded phenolic, 3/4 in. dia. by 3/4 in. high w/aluminum bushing for 1/4 in. dia. shaft; gray color; Communication Electronics, Inc. #1073-1. | Tuning knob | | | | | 2 | |